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A Severe but Honest Budget

THE heavy increase in taxation announced by Sir John Simon in his Budget Speech on Tuesday was a surprise and a disappointment. The income-tax-paying community in particular, including the whole body of productive enterprise in Great Britain, could not take an increase of sixpence in the standard rate as anything but a severe blow. The Chancellor of the Exchequer justified the sternness of his proposals with the argument that he was introducing a Rearmament Budget. Let it be said straight away that the commercial community, without any exception, recognises the gravity of the continuing crisis and the urgency of the colossal defence plans which the Government are carrying out. Men actively engaged in industry and commerce, too, are not tax-evaders. They will not shirk an iota of their responsibility, and will loyally, and even cheerfully, make the contribution to taxation demanded of them. They are as stout upholders of orthodox finance as Sir John Simon himself. They did, however, feel on a first reading of his speech a certain lack of sympathy and imagination in the Treasury approach to the national problem.

In the first place, the response of the taxpayer to Mr. Chamberlain's last appeal as Chancellor of the Exchequer had been so splendid as to yield a surplus on last year's accounts of nearly £30,000,000. In normal times that would have meant sixpence off the income tax. As these are abnormal times, the taxpayers had no such expectation, but did at least cherish the hope that things would be left as they were, the more so as they had been called upon for an increased income tax contribution in each of the two preceding Budgets. In the alternative, as those increases were at the rate of threepence a time, they might fairly have been excused in anticipating no higher increase at the third time of asking. The stark reality is an increase of the standard rate to a height not reached since 1921, and to within sixpence of the highest rate ever imposed in this country in the crisis of the Great War. The remaining additions to taxation, twopence a pound on tea, and a penny a gallon on petrol and oil, are no more than consequential on Sir John Simon's treatment of the income tax, for they spread the burden so that it touches every citizen in the State. They will not be popular, but in this case, too, the taxpayer will honour his bond if the Chancellor of

the Exchequer is able to convince him of the need.

Accordingly, the forthcoming Budget debates will be more important than they usually are. It will not this time be merely a matter of the House of Commons registering the decrees of the Government. Ministers find themselves in the position of having to justify an unpleasant policy. No financier in his senses would dispute Sir John Simon's contention that rearmament should not be met entirely out of loans. The generation which is seeking to defend its own hearth and home in a period of emergency should shoulder as much of the cost as it possibly can within the limit of its resources. The voters at large fully realise that they must pay for their own safety, and not pass on the burden to their children and grandchildren. Still, they feel it instinctively that the heavy new factor of rearmament should have been more frankly adjusted than it has been to the normal expenditure incurred by the State. The Government are spending up to the hilt on emergency military services, and at the same time are budgeting for a considerable increase of their civil expenditure. Granted the first need, all the canons of sound finance dictate that stern retrenchment should have been enforced elsewhere. But Sir John Simon had no plans of national economy to lay before the House of Commons. It was left to one of the Leaders of the Opposition, Sir Archibald Sinclair, to make a call for economy. He asked that the war-time precedent should be followed, and that a Committee should now be set up, with wide powers, to examine the expenditure of all Government Departments. This was a wise and statesmanlike proposal, and poses the real dilemma before Sir John Simon. He is attempting to obtain the sanction of Parliament for a war-time Budget and a peace-time Budget in

the same year. Members of Parliament, and the commercial community outside, must press for economy at all costs. Sir John Simon warned the House of Commons that the peak of expenditure on rearmament had not yet been reached, and the inference was that there are at least two even more severe financial years in front of the nation. There are proved limits to the productivity of all forms of taxation, and it would be a terrible thing if the Treasury ran the risk of raising direct taxation in particular to a point at which the stream ceased to flow.

The more sombre points in

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With the gradual depletion of the soil minerals must come a similar depletion of the minor elements in our food and consequent deterioration in its quality and its ability to maintain health at its optimum level. What are we doing to remedy this?

—F. H. V. Fielder.

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the Budget having been faithfully examined, it is only right that the Chancellor of the Exchequer should receive a tribute for his lucidity and exposition, and his moral courage in facing the problem according to his view of the ethics of the matter. His critics may think that his financial outlook is too rigid, but it should be said on his behalf that his orthodoxy is

preferable to the speculative optimism of some of his predecessors. He is treading the hard road which Mr. Chamberlain followed with great success in the series of Budgets for which he was responsible during the premierships of Mr. Macdonald and Lord Baldwin. The Budget of 1938, if hard and unimaginative, is honest to the core.

Notes and Comments

Planning the Laboratory

THERE is a saying that good work, mental or physical, can only be done if one is comfortable. The early achievements of the chemist, and nearly all the classical researches, however, were made under conditions which would appear to give the lie to the statement. Owing to the nature of the work, these pioneer investigations were undertaken in out-of-the-way rooms for which no normal use could be found. This tendency has persisted to a greater or less extent until recently. But new chemical laboratories which have been put up within the last few years, particularly those of B. Laporte, Ltd., at Luton, and of the Dyestuffs Group of I.C.I. at Blackley, show that more consideration is being given to the comfort of the inhabitants and it is realised that convenience, which is, after all, almost synonymous with comfort in this respect, is a principal factor in the successful working of a chemical laboratory. Convenience should be the guiding rule in planning. Time and thought devoted to deciding the positions of the benches relative to the various "services," fume cupboards, balances, stock reagents and the many other things which are constantly required and which, in so many laboratories, are placed far away from the working bench, is amply repaid.

Laboratory Equipment

BBETTER and generally more convenient accommodation goes hand-in-hand with better apparatus and equipment. It is said that a bad workman complains of his tools but in the case of the chemist the ultimate success of his work so often turns solely upon the accuracy of the instruments at his disposal that he would be amply justified in complaining that they were not sufficiently accurate for his purpose. To imagine the quantitative analysis of a complex mineral being carried out with all care exercised in the stages of separation, precipitation, and drying and the final weighing being made on a balance accurate only to the first or second place of decimals, would be an extreme case, but it is an example of what sometimes happens in a less exaggerated way even in the modern laboratory. Accuracy and precision is impossible with poor equipment. In quantitative work good apparatus may not be so essential but it is nevertheless a safeguard against unfortunate accidents. Few chemists have not experienced the tragedy of losing their material halfway through a lengthy organic synthesis by the collapse of make-shift apparatus or the breakage of cheap glass-ware. Equipment should be complete; the best quality pays in the long run.

Social Relations of Science

SCIENCE is the corner-stone on which our civilisation has been erected but while scientific progress is largely responsible for the advancement of the state of human life at the same time it is bound to bring in its train problems

affecting the social, economic and political relations of man. Last week's issue of *Nature* contained a special supplement announcing the suggestion that an organisation should be formed to study the social relations of science and giving the comments of prominent scientists upon the scheme. In short, it has been suggested that there should be a society for the Study of the Social Relations of Science with its council, regular meetings, and publications. It is intended that it should receive, read, discuss, and, after consideration by suitable referees, publish papers submitted to it, its attitude to these papers being scientific and objective. It is pointed out that it would be a society for the advancement of knowledge, not a propagandist body for the advancement of science in the public esteem nor for the advancement of professional scientific interests. The idea finds considerable support in the representative opinions published in the supplement, with practical suggestions regarding the work of the society and some specific problems which require attention at the present time and which could be discussed fruitfully. The chief difficulties foreseen are in retaining a cool, scientific attitude towards emotional and political subjects and of obtaining a fair, unbiased board of referees.

A Stimulus to Empire Trade

SIR ERNEST BENN, the chief proprietor of THE CHEMICAL AGE, received on Monday from Mr. Edward Wilshaw, the Chairman of Cable and Wireless, Ltd., the following telegram. "On the inauguration to-day of the reductions in overseas telegraph charges under the new Empire flat rate scheme, I venture to hope that our desire to serve in this way the social and commercial interests of the Empire may be fulfilled, and that in particular it may bring benefit to your own undertaking." The date should become historic, as it marked the opening of a new era in Empire communications. The new Empire flat rate works out at no more than one and threepence a word for ordinary telegrams, and is positively reduced to fivepence a word for letter telegrams, with a minimum of twenty-five words. These low costs apply not only to urgent messages between Great Britain and her sister and daughter States, but between any two places in the British Empire. It is a scheme calculated to stir the imagination, and in particular should be a powerful stimulus to the trading community in this country, which is increasingly anxious to develop its already expanding business relationship with every part of the Empire.

The "British Drug Houses Fellowship"

AN interesting announcement was made by Mr. Charles A. Hill, chairman and managing director of the British Drug Houses, Limited, at the annual general meeting on Monday. The company has instituted a research fellowship at University College Hospital for investigations upon the clinical application of hormone products. Another valuable link has thus been forged between a manufacturer's research workers and those engaged in the practical testing of the company's products.

The Special Equipment of the Food Laboratory

By
J. F. MORSE

THE usual chemical and physical apparatus necessary for the analysis of foodstuffs is so well known that it is proposed to discuss some of the more modern and, perhaps, less familiar items which may be applied to food technology.

"Weathering" and "ageing" tests are standard practice in the paint, rubber and textile industries and as many food products are packed in glass the behaviour of the contents on exposure to sunlight is of first importance.

The uncertainty of English sunlight, and also its seasonal variation, renders the obvious practical test almost impossible during many months of the year. However, the Osram U.V.1 Lamp¹ (Fig. 1) provides a very convenient substitute for sunlight. In the first instance the incandescent filament vaporises sufficient mercury to allow the arc to strike between the tungsten electrodes. The rays then emitted have the theoretical advantage of giving an almost continuous line spectrum (as contrasted with the few well spaced lines in that of the usual mercury type of burner), while the composi-

tion of the glass globe is such that its transmission in the ultra violet corresponds to that of sunlight. The equivalent of 1 hour's mid-summer noon sunlight in terms of exposure to an artificial light source is difficult to determine, but some idea may be obtained by actual comparison with a photo-electric cell.

An Ideal Source of Monochromatic Light

Monochromatic light is very desirable for the illumination of precision optical instruments. Mercury vapour light particularly lends itself to this purpose as the principle lines in its spectrum may be easily isolated by the use of appropriate filters. Until recently, a source of small area and great intensity has not been available, but H. Wrighton² has pointed out that the Osira lamp³ (Fig. 3) is ideal provided that the protective pearl globe be removed. With suitable filters this lamp fulfils all the requirements for visible mono-chromatic light and also gives efficient "illumination" for ultra-violet microscopy.

Interesting possibilities are opened up by the recently introduced polarising devices. These are of two types. The "Polaroid"⁴, developed by Land in America, consists of a cellulosic film holding in suspension a multitude (about 10^{12} per sq. inch) of double-refracting dichroic ultra microscopic crystalline needles of luteo-cobaltic periodosulphate. These are accurately orientated in such a way that the entire film acts as a single crystal. Protection against mechanical damage is afforded by cementing the film between glass and in this condition it is stated to be unaffected by age, ultra-violet light or temperatures up to 250° F. As comparatively large areas are available the material may be used for the detection

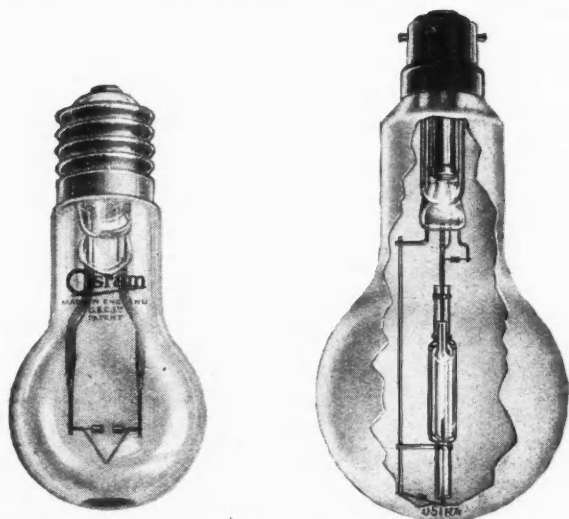


Fig. 1. Osram U.V.1 lamp.

Fig. 3. The Osira lamp.

tion of the glass globe is such that its transmission in the ultra violet corresponds to that of sunlight. The equivalent of 1 hour's mid-summer noon sunlight in terms of exposure to an artificial light source is difficult to determine, but some idea may be obtained by actual comparison with a photo-electric cell.

The effect of ultra-violet rays on the contents of glass containers is somewhat uncertain since, apart from the longer wave lengths, most of the energy is absorbed by the glass. In the case of coloured wrappers, labels, dyed samples and material that can be exposed directly, very rapid results may often be obtained although, unfortunately, the effects do not always correspond to those obtained by exposure to sunlight. The "Vi-Tan" Lamp⁵ (Fig. 2) is a convenient source of ultra-violet radiation. Consuming but 50 watts, 99 per cent. of its emission is stated to be at the wavelength 2,536 Å. Although this energy is not transmitted by Woods glass, the radiations of greater wave length are sufficient to afford very useful fluorescence effects when the burner is screened by one of these filters⁶. J. A. Radley⁴ has summarised the scope of this application to food analysis. Another recent publication⁵ records the effects of ultra-violet rays on colouring materials generally. Since the "Vi-Tan" burner runs at approximately 110 milliamperes the heating effects are but small. If so desired this would allow the burner to be detached from the cabinet—

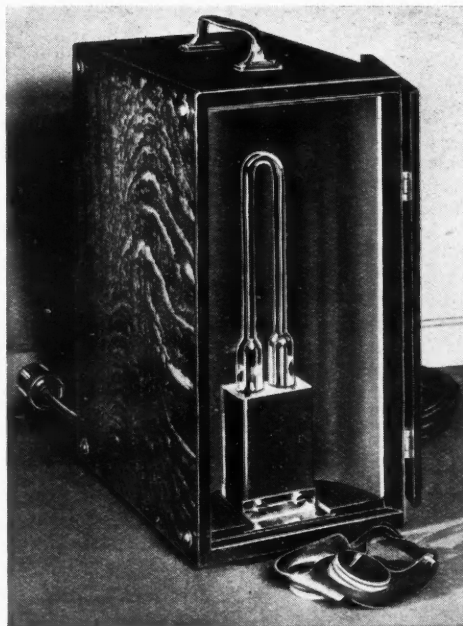


Fig. 2. The Vi-Tan lamp.

of strain in glassware, the measurement of gloss and other applications requiring polarised light. "Polar" screens¹² have been especially marketed for photographic purposes and are useful for the elimination of reflections from the surfaces of glass, water, polished wood, paint, paper, etc. Metal surfaces, however, must be illuminated by polarised light if reflection is to be subdued by a lens filter. The other type of polarising filter¹³ utilises a double refracting crystalline dichroic plate of Herapathite (iodio-sulphate of quinine). Photographic screens, microscope analyser and polariser are supplied, but large areas of this material are not yet commercially available.

The Spectrograph is a somewhat expensive item, but one capable of saving much time and yielding valuable information from microscopic samples. The excellence of British instruments is so well known that mention may perhaps be made of the Zeiss Universal Spectrograph in which provision is made for the interchange of optical equipment. This has the advantage of allowing the plate to be occupied either by the visible or the ultra-violet spectrum. The increase in dispersion, so secured, is particularly useful in a small instrument. A

formed into ones of a greater wavelength. Liquid paraffin dissolved in an organic solvent is a mixture widely employed with success. More convenient are the Eastman ultra-violet sensitive plates¹⁷ on which a film of the ethyl carboxylic ester of dihydrocollidine has been deposited; as with the mineral oil it is necessary to remove the film of fluorescent material with a suitable solvent (acetone) prior to development. A new addition¹⁸ to the Ilford range of plates is stated to have a very rich silver halide layer at the surface and to possess good keeping qualities. While of value to those who expect the best results possible from their instruments, special plates are not really necessary for a great deal of work. Excellent general results (in the ultra violet) may be secured by the use of a plate of the thin film type.¹⁹

Although often lacking, apparatus for photomicrography should be regarded as essential in every food laboratory. Not only may permanent records be kept, in photographic form, of the microscopic appearance of adulterated or suspected raw materials, but where quality depends on particle size or degree of dispersion it is as important to record the microscopical examinations as it is the chemical characteristics of the pro-

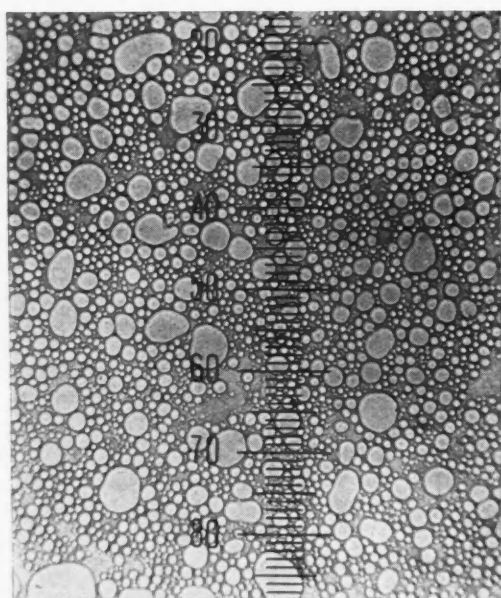


Fig. 4. Photomicrograph with eyepiece micrometer.

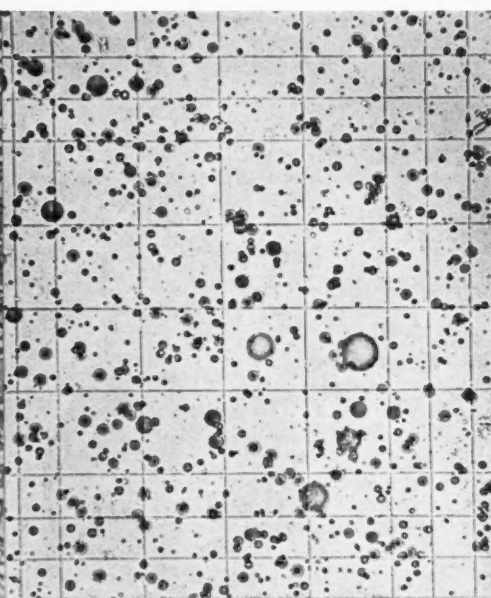


Fig. 5. Emulsion photographed by the Hvidberg method.

spectrograph may be employed for the rapid detection of metals in capping foils and capsules (regulations concerning the composition of such are in force in many export markets), for the examination of solder, aluminum caps, non-ferrous metallic samples, etc. Other applications include the examinations of specks occurring as impurities, dusts, stains, and the ash residues following ignitions. Apart from vitamin assays, quantitative absorption photometry (necessitating special apparatus) is not usually an essential routine examination in food work. Much useful qualitative absorption data may be obtained, in fact, with a standard instrument: the ultra-violet transmission of wrapping papers, the glass containers for photo sensitive preparations, etc. The general scope of spectroscopy in Analytical Practice has been conveniently outlined.¹⁴

The data obtained in the ultra violet are usually of the most importance and since the gelatin of the photographic plate commences to absorb ultra-violet light below about 2,500 Å special plates are required to record radiations in the neighbourhood of 2,000 Å. Schumann plates¹⁵—in which the gelatin has been almost or completely removed—are available, but their cost is prohibitive for general purposes. Duclaux and Jeantet¹⁶ suggested bathing the plate in a solution of a fluorescent material, whereby the short waves would become trans-

mitted. Inexpensive eye-piece cameras, to attach directly to the microscope, may be obtained from most makers, but preference should be given to an extension bellows camera. This greatly increases the usefulness of the ensemble, as when equipped with a suitable lens it enables ordinary photographic technique to be carried out. Thus it is possible to illustrate reports and investigations, examine suspected alterations, accidental or intentional obliteration of records, orders, address labels, etc. In the latter connection infra-red plates and a suitable filter might yield the required results.²⁰ Where cost is not of first importance most excellent universal outfits may be obtained.^{21, 22} Microscopical examination and photographic recording are necessary in connection with the grinding and/or sifting of sugar, salt, spices, gums, etc. Also for checking the refining of chocolate, the crystal formation in fondants and the control of emulsions such as salad cream and mayonnaise. Many other applications are possible and depend upon the type of material examined.

Photographs should be taken in conjunction with an eye-piece micrometer of some type (Fig. 4) and the value for the particular magnification permanently recorded on the negative. In the case of emulsions the usual method of preparing a slide may give rise to erroneous conclusions as the large globules are liable to be flattened out (Fig. 4); a Hvidberg²³

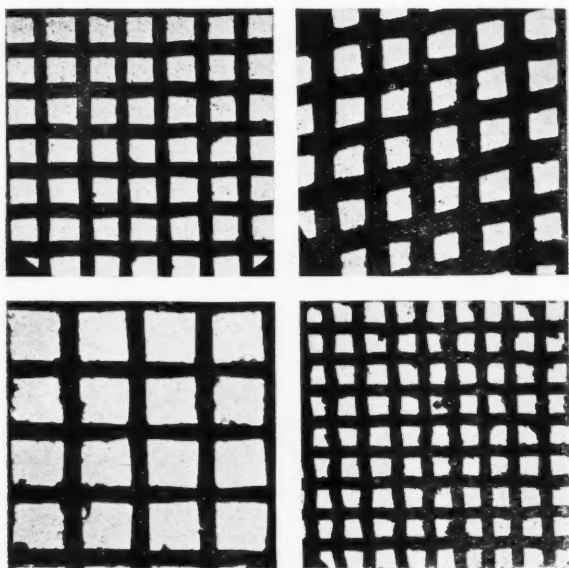


Fig. 6. Photomicrographs of four wire screens, stated to be identical.

technique, modified to suit the product in question, should be adopted (Fig. 5). This method has the advantage of eliminating the personal factor and the experience necessary to select an average field; moreover the photograph provides the information from which may be calculated the number of globules per c.c., the average globule size and the approximate volume ratio of the phases. Photomicrography may frequently be the deciding factor in a dispute, as instanced by the following examples: Four sifting machines giving varying outputs with some difference in particle size were stated to be provided with identical screens. Photomicrographs (Fig. 6) instantly revealed that this was not so, to the entire satisfaction of all concerned. In another case the question arose as to the origin of small fissures in glazed jars (Fig. 7). The suggestion that jolting in transport and not a fault in manufacture caused the trouble was negated by a photomicrograph of a portion of a jar damaged in this way (Fig. 8). In such cases as these photomicrographs provide convincing evidence to the non-technical minded—and the evidence may be sent by post.

pH determinations are carried out in every laboratory, but those not possessing an electrometric assembly often encounter problems presenting difficulty. Mud-like and opaque substances, pappy, slimy and doggy systems, very rare jams, sauces, pickles, etc., are usually troublesome to deal with colorimetrically. In these circumstances the "Wulff" pH tester²¹ is particularly useful. The various indicators are

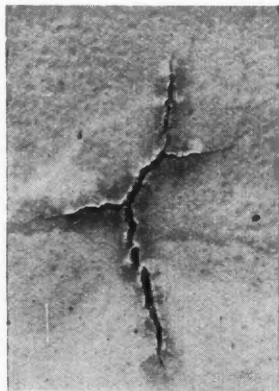


Fig. 7. Fissure in a glazed jar.

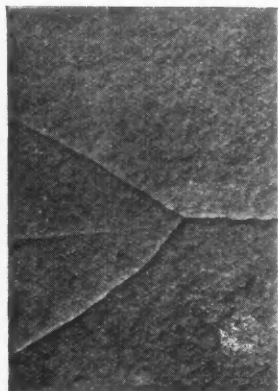


Fig. 8. Glazed jar damaged by knocking.

absorbed in a water-diffusible membrane which—cut into strips—is placed in the sample to be tested. Although the indicator dye diffuses out but slowly, a standard time is given for the immersion, after which the strip is removed, blotted and compared with the standards, which differ by 0.2 pH. These are mounted between glass spaced so that the trial strip may be placed between any two. A carrier is supplied to hold the strip and slid along the standard holder, thus enabling the colour match to be easily made. The system covers the pH range from 1.4 to 12.6 with the aid of six sets of indicator strips and the corresponding standards.

Viscosity control in a food laboratory also presents difficulties since a suitable instrument must be capable of dealing with such widely divergent materials as oils, lacquers, sauces, salad cream and mayonnaise, honey, meat extracts, soups and chocolate. While some of these may be handled in the efflux type of instrument other means must be found for the remainder.

The "Technico" Universal Torsion Viscometer²² (Fig. 9) is capable of dealing with all the viscosity problems likely to be encountered. Its range is stated to be between 100 and 200,000 Redwood seconds and in addition it handles those samples which exhibit thixotropy. The instrument is provided with three cylinders and two torsion wires of differing sizes by means of which the viscosity range is conveniently covered by the six combinations. It is not intended for absolute viscosity determinations but rather for comparing the viscosities of a sample and an agreed standard. However, so that an approximation to a standard method of viscometry may be obtained a graph is issued comparing degrees of dial swing and Redwood seconds for the six combinations of cylinders and wires (Fig. 10). The instrument has the advantage of initial cheapness and simplicity together with quickness and ease of operation. Various accessories may be obtained which further increase the usefulness of the apparatus. A newcomer to this country is the Cleary Chocolate Viscometer²³ especially designed for the chocolate and confectionery industries where very viscous fluids are encountered. Novel features are that the instrument is operated electrically and that it may be immersed in the bulk material. The principle upon which the viscometer functions is the measurement of the drag communication to a spindle rotating at a definite constant speed while immersed in the material under test. The viscosities are recorded in centipoises.

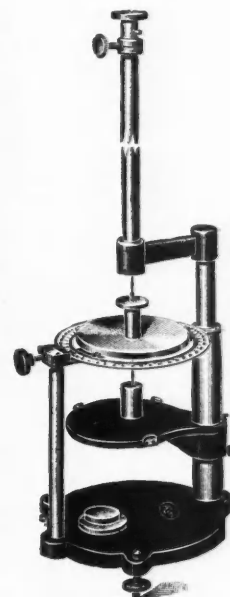


Fig. 9. The "Technico" Universal Torsion Viscometer.

The Projection Refractometer

A refractometer²⁴ of unconventional appearance (Fig. 11) deserves mention as it possesses several important advantages appreciated in food examinations. The material to be tested is placed on the horizontal prism surface and since the light entering the prism is reflected at the interface of the prism and the material under test, there is no need to remove small pieces of solid material such as seeds, pieces of fibre, skin, etc. This is necessary, of course, in instruments where a thin film of the sample is squeezed between two prisms. The source of illumination is contained within the instrument itself; the reading being visible on an open scale—12.5 cms. in length—eliminates the necessity of a magnifying eye-piece. Provision is also made to screen the lamp with either a diffuser or a yellow filter approximately corresponding to sodium light. The scale of the instrument is engraved with refractive indices from 1.380 to 1.517 and soluble solids from 30 per cent. to 90 per cent.

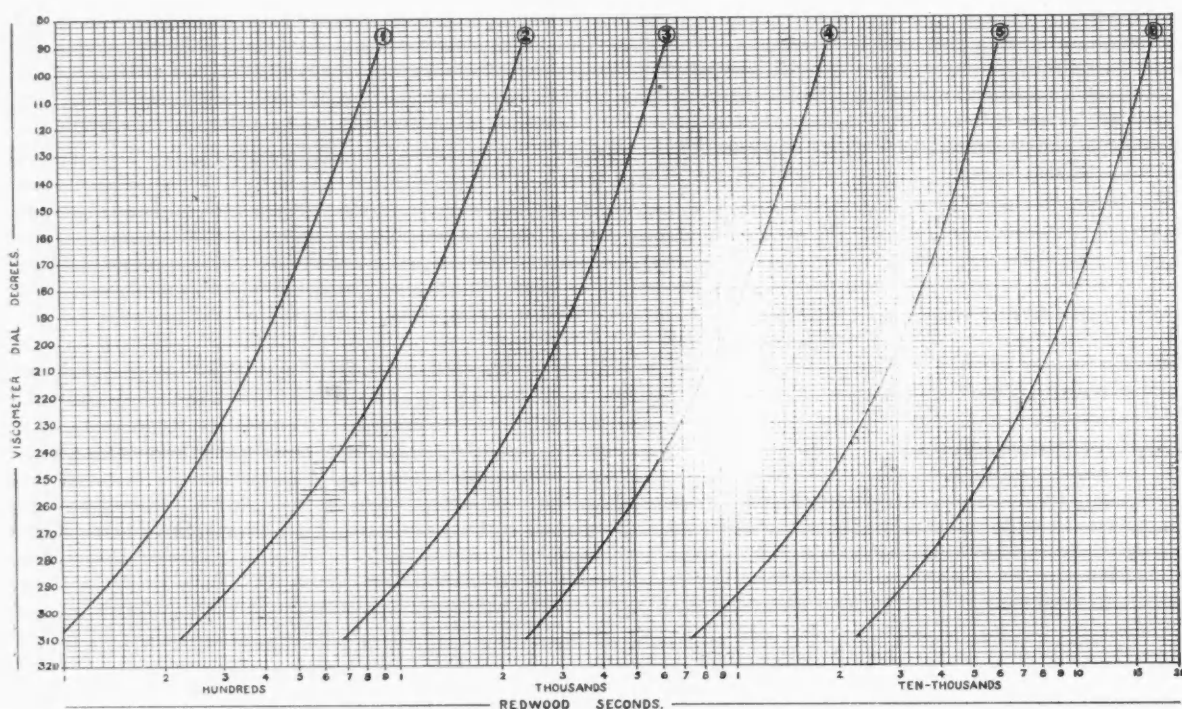


Fig. 10. Approximate relation between viscometer degrees and Redwood seconds.

Where intensity of light is to be measured photoelectric cells are invaluable and many are the uses to which they may be adapted. Various types of cell may be obtained and each has its own special characteristics and application; these have been ably summarised^{28, 29}. For general laboratory purposes the Weston Photronic photoelectric cell³⁰ is, without doubt, the most popular and perhaps the most generally useful for it has the advantage of extreme robustness, constancy and a current output sufficient to allow the use of recording instruments without preliminary amplification. Moreover its spectral response is very similar to the standard eye sensitivity curve (Fig. 12). Photoelectric cells may be adapted to many problems involving colour density, etc., and the arrangement of D.M. Wilson³¹ is typical of such an application for a special purpose. Thus, the colour of malt-extract, browning, vinegar, sugar syrups and a variety of such materials could be accurately controlled. Details have been published concerning the use of these cells in colorimetric analysis³², the for-

water; in which connection it is stated to be sensitive to 1 part of suspended matter in 10 million. A photoelectric comparative "Gloss" meter³³ and a Transparency Comparator⁴⁰ are other applications of interest.

Among modern methods which may be applied to food analysis, that of Chromatographic analysis is outstanding. As the name suggests, it is employed essentially for the examination of coloured material; the separation being generally effected by absorption on alumina. A. H. Cook⁴¹ has succinctly described the achievements of the method together with the apparatus, reagents and technique involved. The process is particularly suitable for the removal of small amounts of coloured impurities, thus Remy⁴² removes interfering material prior to creatine determinations and Bolton and Williams⁴³ utilise the principle for the detection of fuel oil in whale oil. Additional possibilities are provided by ultrachromatography, in which the absorbent column is contained in a quartz tube and exposed to ultra-violet light. Substances with a distinct fluorescence are thus easily separated and possibly identified. Another suggested method⁴⁴ is that of utilising a gold hydrosol in investigations where proteins and carbohydrates require differentiation or where changes in protein structure are involved. An ingenious arrangement for determining the melting points of fats, relying on the scattering of light by colloidal particles (Tyndall



Fig. 11. The projection refractometer.

mation of haze in gelatin over a pH range³⁵ and quantitative studies on yeast suspensions³¹. Many specialised commercial instruments utilising photoelectric cells are now on the market. Frequently they are called colorimeters although they do not record colour, but the light absorbed by the sample. Examples of true colorimeters are the "B. and W. Photoelectric Colorimeter"³⁵ and the more elaborate "Panchrometer"³⁶ in which provision is made to ensure a constant source of illumination. Instruments measuring the light absorbed by a sample are numerous and perhaps one of the best is the "Spekker" Photoelectric Absorptiometer³⁷. The "B.T.L. Photoelectric Turbidimeter"³⁸, designed in collaboration with the Metropolitan Water Board Laboratories, is especially recommended for the measurement of turbidity in

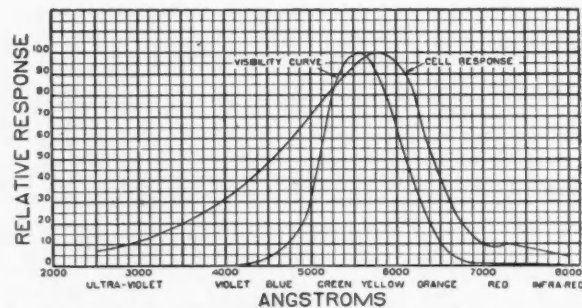


Fig. 12. Spectral response of Weston Photronic photoelectric cell.

beam), has been published by S. A. Ashmore⁴⁵ and physical methods of this type may be applied to the food industry in which so many materials are of colloidal nature⁴⁶.

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- ⁴⁶ W. Clayton: "Colloid Aspects of Food Chemistry and Technology," London (1931).

Annual North-East Coast Chemical Dinner

Chemical Societies' Joint Function

THE annual north-east coast chemical dinner of the Chemical Society, the Society of Chemical Industry and the Institute of Chemistry was held on April 22, in the University Union, King's College, Newcastle-upon-Tyne. Among the guests present were the Lord Mayor and Lady Mayoress of Newcastle-upon-Tyne, the Sheriff of Newcastle-upon-Tyne, the Rt. Hon. Lord Eustace Percy, P.C., M.A., D.C.L., Professor F. G. Donnan, C.B.E., D.Sc., LL.D., F.R.S., Dr. A. Fleck, D.Sc., F.I.C., and Mr. G. H. J. Daysh, M.A., B.Litt., F.R.G.S. Apologies for absence were received from Lord Leverhulme, Sir Robert Pickard, Professor Masson, Dr. P. L. Robinson, Dr. Aynsley, Mr. Leslie France and Mr. Nane.

Following dinner, the chairman, Mr. J. W. Craggs, M.I. Chem. E., proposed the loyal toasts. The chairman suggested that the secretary, Dr. R. Raper should convey the best wishes of the assembly to Dr. J. T. Dunn for a speedy recovery from his present illness.

The Right. Hon. Lord Eustace Percy, Rector of King's College, proposed the toast of "The Profession of Chemistry." He spoke of the manner in which chemistry had developed into a highly skilled profession requiring specialised training, and deplored the present system of grants to prospective teachers as tending to stifle any talents which might develop while at the University. Professor Donnan, President of the Chemical Society, replying to the toast, congratulated King's College on having Lord Eustace as rector and spoke of the benefits which might be expected from the proposed amalgamation of the three societies represented at the dinner.

A toast to "The City and County of Newcastle-upon-Tyne" was proposed by Professor H. L. Riley, A.R.C.S., D.Sc., D.I.C., who emphasised the importance of an academic centre such as the university to the industrial development of the city. The Lord Mayor of Newcastle-upon-Tyne, replying to the toast, discussed the position of the health and education facilities of the city, and showed how great progress was being made in each field.

The final toast to "The Industries of the North East" was proposed by Mr. G. H. J. Daysh, who spoke on the great development of the chemical industries of the north-east during the last twenty-five years. Dr. Fleck, replying to the toast, paid a tribute to the courage and initiative of the little-known people responsible for this industrial development, and maintained that although this region may be classed as a "depressed area," the north-east still had a large number of sound and flourishing industries.

Semi-Micro Fractionating Column

A New Type of Good Efficiency

TO meet the need for an efficient fractionating apparatus for use with from 2 to 10 ml. of liquid, a number of miniature fractionating columns have been described. Most of them are simply small scale models of regular laboratory fractionating columns. To provide for efficient contact between ascending vapours and descending condensed liquid these columns are either filled with some sort of packing, with a simple coil of wire, or are indented so as to force vapour and reflux to travel a long tortuous path. Efficient columns of this type usually require a very slow and carefully controlled distillation and show a great tendency to flooding.

S. Lesesne and H. L. Lochte in a paper read before the Microchemical Section of the American Chemical Society on April 20, described an apparatus designed to overcome these defects. It consists of a smooth, simple column with no packing or indentation, but provided instead with a narrow metal band hung into the column in such a way that it extends about 1 cm. below the bottom of the column. The upper end of the band is fastened to a thin rod which is rotated at a convenient rate up to about 1,000 revolutions per minute.

The rapidly rotating band imparts a whirling motion to the descending reflux and to the ascending vapour so that both of these travel a very long path and have an opportunity to approach equilibrium. Tests on a 15 cm. column of this type showed an efficiency of nearly 1 theoretical plate per inch of column combined with a high capacity for reflux without flooding. A column with 6 mm. internal diameter permits more than two drops of reflux per second without flooding, although greater efficiency appears to be obtained with about one drop per second of reflux.

While carefully insulated columns of 100-200 cm. length could undoubtedly be designed and operated, the authors believe the main field of usefulness for the new type of fractionating column will be for 2-10 ccms. of liquid fractionated through columns of this type with a diameter of 6-8 mms. and a length of two feet or less. It is believed that this column is more easily operated at a relatively rapid rate combined with good efficiency than any other semi-micro apparatus described to date.

Planning a Chemical Laboratory

By

CHARLES HEARSON

THE planning of a modern chemical laboratory calls for specialised knowledge and a careful study of the purpose for which the laboratory is required—manufacturing or process control, final checking of finished products, or research. The size of the room, bench space, cupboard accommodation, etc., will depend upon the nature and amount of work to be performed.

A well-lighted room should be chosen preferably on the shaded side of the building, direct sunlight having a deleterious effect upon many chemicals. The room also should be free from vibration. The possibility of expansion and the necessity for more working space must be borne in mind, it being advisable to choose a room which will permit this, and so obviate the attendant disadvantages of pressing a more distant room into service.

Benches for detail work are preferably arranged round the walls possessing windows; fume cupboards, combustion benches and storage cupboards may be on the wall without windows. If space permits a double-sided centre bench may be of great advantage. The best working height of a bench is 3 ft., whilst the average width is about 2 ft. 3 in. Gangways or spaces between benches should be as wide as circumstances permit; on no account should they be narrower than 3 ft., this distance allowing free passage even if a worker be seated at the bench. If there is no separate accommodation for an office, it is advisable to partition off a corner of the laboratory and equip this with a desk and bookcase. Reference books are best kept away from acids and chemicals, and reports and data should be systematically filed.

There is a wide choice in the method of constructing the benches. If the walls are brick-built, the bench tops may be carried on cantilevers from the wall, cupboards and nests of drawers being constructed as units which slip beneath. This, however, has a disadvantage in that once the benches are in position it does not easily permit of alteration or moving. Another type of bench has the top carried on pedestals in which are housed cupboards or drawers with sinks, water taps, gas, etc., arranged in a knee hole. This construction permits the moving of the bench to another position quite easily at any time. Tubular iron frames can be employed to carry bench tops, the cupboards and drawers being of unit construction as already mentioned. It is well to remember, however, that gas, water and electric services, as well as wastes, have to be taken to various points, so that once a bench is fixed, it may occasion much work and dislocation to alter its position.

Moulmen teak is invariably used for the construction of bench tops; when oiled and waxed it has an almost indefinite life. Acid and heat resisting compositions such as Basolite are often employed for the soles of fume cupboards and combustion benches; white Titaline or stainless steel, slate, or lead-covered tops may be employed according to the purpose for which the bench is to be used.

Cupboard, drawers, and shelving are mostly constructed of teak or oak, these hard woods being extremely durable and also finishing well. Soft woods such as British Columbian pine are also employed, but whereas the initial cost may be lower, the extra expenditure in having furniture of either teak or oak, is repaid by long service and freedom from trouble. Ample drawer and cupboard space is essential, and provision should be made for a long drawer to take pipettes, burettes, and glass tubing.

Gas, water and electricity, and possibly compressed air and vacuum services, may be accommodated beneath the bench or taken in a common duct or covered channel above the back of the bench. In either case it is essential to have them so arranged as to be easy of access.

Due consideration must be given to position and size of sinks. Vulcanite wastes should be employed and acid traps

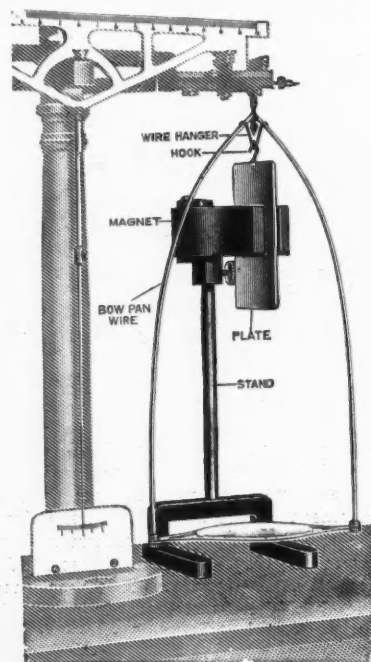
fitted. In cases where there is a possibility of fairly strong acid dilute going to waste, tellurium lead should be employed. Taps should be of the easy clean variety, and all fittings, such as drawer pulls, must be of a non-corrosive nature. All service pipes and fittings not resistant to chemical or acid fumes should be covered with anti-corrosive protecting paint.

When deciding the position of the fume cupboard, due regard must be given to the question of exhaust. This may be either by a gas jet under the flue or by a motor driving a suction fan, the fumes being extracted through a composition ducting to air. In the event of the room possessing a chimney flue, the mounting from the cupboard may be taken into this. Water and gas services with either a sink or suitable drain can be provided inside the fume cupboard, the controls being outside; electric points and lights are better outside.

Storage space for the laboratory is important and apart from cupboards and drawers under the benches, there should be cupboards for general apparatus, glassware, and dangerous chemicals. Reagent shelves should be accessible and special shelves arranged for stock solutions. All shelving may be covered with glass or Titaline.

A separate bench should be reserved for weighing, as free as possible from vibration. In the case of a room on the ground floor, a concrete pillar can be built to carry the balance, but if this is not possible a slate top supported on cantilever brackets from the main wall is advisable. Furnaces, boiling baths and similar apparatus should be accommodated on a separate combustion bench, provided with a hood. A titration bench fitted with an easily-cleaned top such as Titaline, and provided with a shelf for aspirators and clips for pipettes, etc., is a great asset. A blowpipe table, complete with bellows and blowpipe is useful where space permits.

Various refinements may be incorporated, such as pedal-operated bottle washing taps. In the case of benches fitted with reagent shelves, these may be made easily-removable so that the whole width of the bench can become available for use if needed.



The Microid balance damper is a device introduced by Griffin and Tatlock, Ltd., for damping balance swing. It can be quickly fitted to the great majority of analytical balances.

The Metallurgical Laboratory and its Equipment

By
"CONSULTANT"

THE analytical examination of metals and alloys—considered apart from mechanical testing—is now so important from an industrial aspect that laboratory accommodation does not end with the provision of a room where chemical analysis alone is carried out. Irrespective of whether the work has a research bias or is a strict routine for checking quality, either in production or utilisation, chemical analysis is always supplemented by microscopical and spectrographic examination. Special rooms must therefore be set aside for the work of preparing specimens for the microscope and the taking of photomicrographs, as well as for taking spectrograms, both lines of investigation making it necessary to provide a photographic dark room. Photomicrographs which are permanently placed on record are invaluable for the comparison of physical properties, and the same remark applies from the point of view of chemical composition in the case of spectrograms. In addition, of course, it may also be necessary to make provision for the investigation of such problems as resistance to corrosion, surface preparation for enamelling, electroplating, etc., and possibly with regard to melting practice and annealing for which electric or gas-fired furnaces and other apparatus has to be installed.

General Planning

The general planning as regards benches, fume chambers, sinks and service pipes in the room which is devoted to analysis by chemical means, will more or less follow the lines indicated in the case of any other laboratory where chemical analysis is carried out, but fume cupboards and hoods to carry away acid vapours from open benches should be installed on a more generous scale. Fume cupboards should have both top and bottom draught, either or both of which may be used at any time, and the electric lights which are situated inside the cupboards must be vapourproof. Stainless steel is a very suitable material for the construction of the hoods, as this metal gives good resistance against attack by acid fumes and is also easily cleaned. The fumes can be carried off in ducts made of asbestos-cement pipe and if desirable they can be neutralised by a spray of caustic liquor passing over a series of baffles at some convenient point outside the room. This disposal of acid fumes will be found very essential if part of the work of the laboratory concerns investigations into the corrosion of metals exposed to the atmosphere, or whenever the roof of the laboratory building is utilised as a kind of testing station for corrosion investigations. Bench tops inside the laboratory will be found more satisfactory if made of soapstone or one of the special materials which are now available, rather than teak or wood covered with sheet lead. Stone, slate or concrete slabs are probably the most suitable for those benches on which furnaces are to be mounted. Adequate and wide bench space will be found an advantage, because a large number of identical determinations may have to be in progress side by side, i.e., a number of samples may be dissolving simultaneously, titrated, or precipitated and filtered. Separate benches are advocated for the analysis of ferrous and non-ferrous alloys, and it is well to have a special bench solely for the purpose of making microchemical tests where alloying elements or impurities may be present in minute quantities.

The frequent determination of carbon in ferrous alloys will require the permanent set-up of a carbon furnace by means of which results may be obtained rapidly and accurately. Special apparatus is also obtainable for making a rapid determination of the carbon content in alloy cast irons, the carbon dioxide which is involved being estimated volumetri-

cally in apparatus of the Strohlein type. Phosphorus and sulphur also have to be determined by equally suitable methods of analysis. Electric muffle furnaces are needed for experimental heat treatment and are desirable for the ignition of precipitates in the course of gravimetric analyses. A small drilling machine must be installed to prepare suitable representative samples for chemical analysis, because metals and alloys may come into the laboratory in the form of bulky pieces. A Soxhlet extraction apparatus is needed for the purpose of removing oil from the drillings; a non-inflammable solvent such as trichlorethylene will be found most satisfactory in this connection.

Photomicrographic Equipment

Special apparatus is obtainable for the surfacing and polishing of metals for examination under the microscope. Photomicrographic equipment has now reached a high degree of refinement which allows positive and permanent alignment of the light source, microscope and camera, so that good photomicrographs can be prepared at great speed and passed to the dark room for developing and printing. Special consideration must be given to selection of this equipment, in order that it may be possible to make very critical observations of internal structure and determine the true influence of the impurities which are present in extremely minute quantities. Magnifications up to 20,000 are now possible by the use of equipment of the Reichert type. With the modern micro-cameras the optical system is so much improved that any image which is focused sharply in the eye piece is reproduced with equal sharpness on the photographic plate or film. The use of a specially designed microscope used in conjunction with X-ray examination will not only reveal the crystalline structure of a steel upon which certain properties mainly depend, but will also show the presence of imperfections such as very minute blow-holes in the body of a piece of cast metal, fine cracks, poor welds, etc., all of which will very considerably affect the safe use of the metal. From a research point of view additional information may be revealed by the use of an electron diffraction camera.

Applications of the Spectrograph

The growing complexity of alloys, and the increasing appreciation of the importance of small quantities of impurities, as well as the necessity for making rapid decisions about composition, have all contributed to bring about a wider use of the spectrograph in metallurgical laboratories. Accessories and methods have now been so perfected that much quantitative work by the usual methods of chemical analysis can now be replaced by spectrographic technique. For critical work the spectrograph should be chosen to give the best possible definition of lines over the whole range from 2,000Å to 5,000Å, with flatness of field so that ordinary photographic plates can be used. Accessories are needed for examining the lines upon the spectrogram and for making comparisons with standards which are kept on permanent record. The use of a spectrum projector to show the spectrogram at a suitable magnification upon a white base board will obviate eye-strain, as both eyes can be used in the normal way instead of tiring one eye by the observation of a large number of spectrograms under an eye-piece magnifier. If a spectrum line photometer is included with the equipment a quantitative evaluation of the spectrogram can be made with the minimum of error and by a technique which does not become tiresome. In this photometer a photo-electric cell is utilised to measure the intensity of a standard light source after passing through

the spectral lines on the photographic plate, and so give an indication of the blackness of any particular line.

The actual selection of the specialised equipment for a metallurgical laboratory must be made with due consideration of the amount of money which is to be spent. It should be noted that equipment for highly critical work is expensive, but the results which can be obtained will often justify what

may seem to be an excessive charge. Simpler types of equipment, however, are available, and if the laboratory staff is not too well experienced, it may be desirable to make use of some equipment which is constructed on simple lines, because even here it will be possible to obtain results which are of great value in supplementing those obtained by other methods of investigation or by chemical analysis alone.

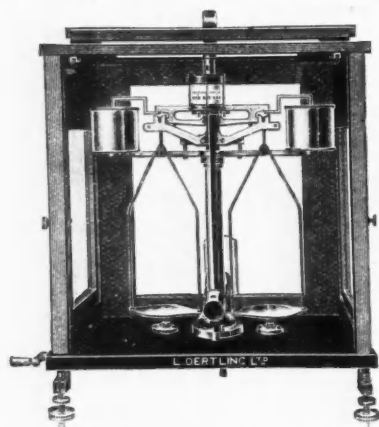
Developments in Balances

Refinements Introduced for Increased Speed and Accuracy of Weighings

ALTHOUGH in many well organised laboratories considerable attention is given to the selection of balances, this is a subject which is not always dealt with as systematically as might be the case were there a wider knowledge of the latest developments.

Until a few years ago there was really not much choice when it came to the matter of an analytical balance. The degree of sensitivity was more or less standardised at that which would give a reasonably reliable figure for the fourth decimal place when weighing in grams. Balances with long beams and slow action were usually avoided except by a few diehards.

Recently, however, there has been a great change in the



An up-to-date prismatic-reflecting balance with air damping device (L. Oertling Ltd.).

position. It can now be definitely asserted that the old-fashioned, essentially simple, balance is out of date for use in any laboratory where large numbers of weighings are the rule and time a factor. Since the war, development in the design of precision balances has been active, and to-day's balance is a very different instrument from the average pre-war article. Particularly, it enables the analyst to get quicker readings to the required degree of accuracy. This is effected by damping the action, by means of an air dash-pot or magnetic brake on the swing of the beam, and also by improved methods of taking the reading. Often, for instance, the need of small fractional weights is eliminated by means of an effective precision method of reading the actual deflection of the beam. In one well-known British instrument this takes the form of a divided graticule attached to the end of the pointer. An enlarged image of this is projected optically to a suitable position at the top of the balance case where the fractional weights are quickly read off without the use of small weights or riders. Such a prismatic-reflecting balance may also be aperiodic if fitted with a device to damp the free swinging of the beam as already noted. The combination of aperiodicity with prismatic-reflecting action speeds up work enormously where large numbers of accurate weighings have to be made as a matter of routine.

Another direction in which there has been great activity is in the development of micro- and semi-microchemical

balances. The work of Dr. Pregl and others has led to a wide adoption of micro methods of analysis, and balances that combine the necessary high sensitivity with the sturdiness to withstand ordinary laboratory use have been specially developed.

When, therefore, there is any question of buying one or more new analytical balances, modern developments should be taken into full consideration before a decision is reached. Generally speaking, the latest semi-automatic instruments are, of course, rather more costly than the older simple types, but the increased speed and accuracy secured by their use in many cases more than outweighs the extra outlay. Although such modern instruments embody many refinements, an inspection of a well-known British made range of the latest designs shows that there has been no loss of traditional simplicity and sweetness of action.

When a new balance is being installed, every care should, of course, be given to its correct setting up, and the makers will generally co-operate. Particularly in the case of micro-balances it is necessary to secure the greatest degree of freedom from vibration and stable temperature conditions. Generally, the more sensitive the instrument the greater care must be taken in its initial setting up and adjustment. In the latter connection it is now possible to have all the balances in a laboratory periodically "serviced" by expert mechanics sent out by the makers, and many firms now avail themselves of this convenient arrangement.

Settlement in Libel Action

Manufacturing Chemists v. Printers and Publishers of Monthly Journal

IN the King's Bench Division on Wednesday before Mr. Justice du Parc, a settlement was announced in the action by Walfox, Ltd., of High Holborn, against Merritt and Hatcher, Ltd., printers, of Blackheath Road, and Creative Journals, Ltd., High Holborn, and Mr. John M. Ryan, to recover damages for libel.

Mr. Slade, for the plaintiffs, said his clients were manufacturing chemists dealing in a large range of medicines and toilet goods which were sold under their registered trade mark "Walfox Brand." Their goods were not sold in competition, but under their own name, and had a large sale, being the best quality goods. The first defendants were the printers, the second-named defendants, the proprietors and publishers, and Mr. Ryan was the editor of a monthly journal called "Shelf Appeal." The plaintiffs explained that in an article headed "Bootleg Brands" defendants had published words which reflected on their products.

Counsel said the defendants had agreed to pay a sum by way of damages and to indemnify them in respect of their costs. And further, they would publish an apology in agreed terms in the periodical.

Mr. Valentine Holmes, for the defendants, agreed to those terms, and said the apology of defendants would be repeated in their paper.

His lordship concurred in the settlement on the terms stated.

The Refractometer and the Spectroscope in the Laboratory

By

THOMAS L. TIPPELL

OF the principal classes of optical equipment in the laboratory this short article will be confined to two, the refractometer and the spectroscope. Both take very important places in laboratory equipment at the present day.

The refractometer can be of one or other of two broad classes. The first measures refractive index; the second differences in refractive index. The first is used principally to determine the identity of a substance (e.g. an essential oil) or to measure solutions of comparatively high concentration (e.g. sugar in jams) or gross adulterations, and has as its principal members the Abbé refractometer, the dipping refractometer and the butter refractometer. The second class serves to measure small differences in concentration of solutions or changes of state resulting in small changes of refractive index and includes interference refractometers.

The Abbé refractometer is the most frequently encountered general purpose instrument, and though made by a number of different makers in this country and abroad its main features are similar in all cases, refinements of design constituting the variations as between one make and another. It reads directly in refractive indices (or in percentages of soluble solids) from Nd 1.3000 to 1.7000 with an accuracy of about 0.0002. It only requires a few drops of liquid. It is as compact and self-contained as a microscope and is simple to use. Although readings are for the sodium D lines, white light is used.

Differences between Makes of Refractometer

The main differences between makes are to be found in the means of reading the scale and the type of control, or, slow motion, that is fitted to the reader arm. In one well-known make the reader line is ruled on a glass disc and the slow motion is continuous in action over the whole range of movement; while another has a side index, free from parallax, and a short range slow motion permitting rapid movement of the reader from one end of the scale to the other while giving fine adjustment just where it is wanted. The type preferred will be a matter for the judgment of the user.

One important use of the refractometer is in the rapid determination of the sugar content of jams and similar substances and most Abbé refractometers can be provided with a scale for reading this directly. In the case of very opaque substances it may not be possible to read them in the normal way, by transmission, and in such cases a reflection method must be adopted. A few instruments have provision made for this, but it is something of a compromise. A new type of refractometer recently put on the market for this special purpose is to be preferred. It is read by projection to an accuracy

of about 0.001, which is sufficient for this purpose, and can be operated rapidly.

The dipping refractometer is of use when more accurate measurements of refractive index are required and is capable, with careful temperature control, of an accuracy of 0.00003. It requires a much larger quantity of liquid than the Abbé, is not direct reading and for any one prism only covers a small range of refractive indices. Modern examples of this instrument have as many as six interchangeable prisms.

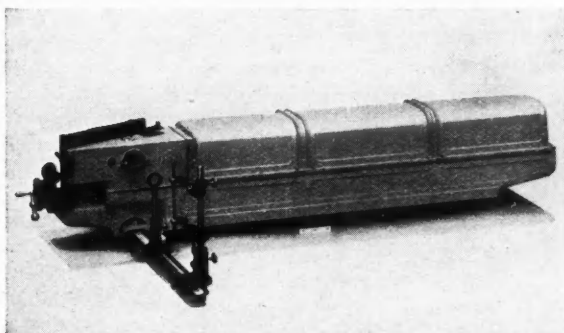
Interference Refractometers

Interference refractometers are often to be preferred to the dipping instrument when small differences of refractive index are required. As measurements can then be made between two closely similar liquids simultaneously, temperature control will not be so critical as when the indices are measured separately and subsequently compared. Readings with this class of instrument are arbitrary but may frequently be used as direct measures of the phenomenon under observation. Owing to the exact adjustment of the optical system that is required instruments of the simplest and most robust construction are to be preferred. There are instruments of this type available for the analysis of gas mixtures.

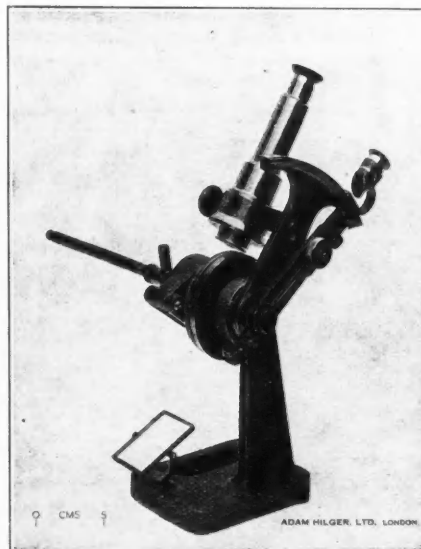
The spectroscopic equipment of a laboratory is assuming an increasingly important role and here again the functions of the instruments can be divided into two classes. In the first we have the confirmation of the presence or absence of an expected metal in a substance, while in the second there is the identification of an unexpected metallic constituent. The first problem can usually be efficiently resolved with a visual spectrometer of a suitable type. The second is better dealt with by means of a photographic instrument, a spectrograph, which should preferably be used in the ultra-violet.

The Constant Deviation Wavelength Spectrometer

A most convenient type of visual spectrometer is, the constant deviation wavelength spectrometer. Instruments of this type have a boldly engraved wavelength scale usually engraved as a helix on a cylinder, which tells at once the wavelength of any line that falls upon a fiducial mark in the eyepiece. Thus the first purpose is most readily fulfilled by set-



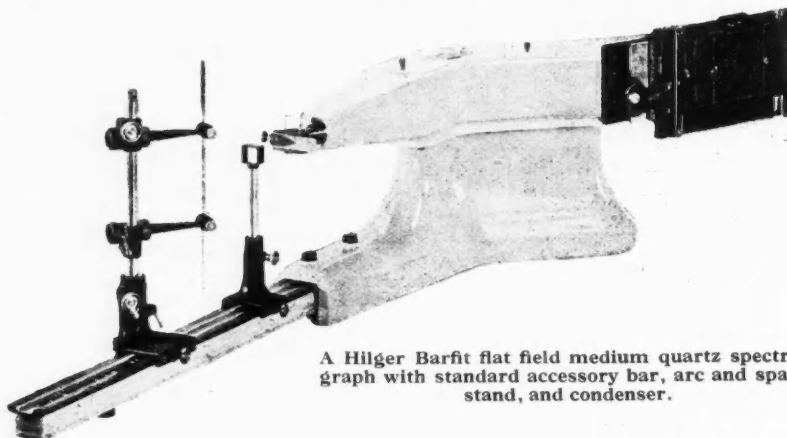
Left: A Hilger fully automatic large quartz spectrograph such as is used for the analysis of alloys, steels etc. Right: Abbé refractometer as made by Adam Hilger Ltd.



ting the drum to one or more known wavelengths in the spectrum of the metal sought and noting the presence or absence of the corresponding lines. The lines in question are chosen from the books of wavelength tables which are available. The most modern of these instruments are fitted with devices to simplify the alignment of accessories and can be fitted with various optical systems covering a wide spectral range.

Quartz spectrographs, such as are best fitted to deal with the second class of problem, are of one main class, but vary in the extent to which they space out the spectrum lines. The size to be used depends mainly upon the substance to be analysed with respect to the complexity of its spectrum. Thus lead alloys, which have relatively simple spectra, can be analysed with a small spectrograph giving the whole spectrum from 1850Å to 10000Å on a quarterplate, while for the analysis of alloy steels, the spectra of which have some thousands of lines, only the largest instruments can be considered as being satisfactory. Such instruments are of the Littrow type and yield spectra some 67 cms. in length which are taken in three or four exposures on a plate 10 in. by 4 in. Between these two sizes others are available. That most generally useful in general chemical problems is called by British makers the Medium size and takes the whole spectrum from 2000Å to 10,000Å in a single exposure on a plate ten inches in length.

The extraordinary advances that have been made in spectrographic technique in the last few years are not always known or appreciated to the full. The accomplishments in the direction of quantitative spectrum analysis cannot be adequately summarised in the limited space available for this article. It must be stated, however, that the spectrograph used in conjunction with a microphotometer offers a means of routine quantitative metallurgical analysis of unpre-



A Hilger Barfit flat field medium quartz spectrograph with standard accessory bar, arc and spark stand, and condenser.

cedented speed and accuracy. It is, moreover, a cause for gratification that very much, if not most, of the progress in this important work is due to the development of the necessary apparatus at the hands of British optical instrument makers.

The Action of Hydrogen upon Coal

The Development of a Small-Scale Liquid-Phase Continuous Plant

THE Department of Scientific and Industrial Research has issued a third report published by H.M. Stationery Office, price 9d. net, in the series dealing with the hydrogenation of coal. Part I of the series published in 1931, dealt chiefly with the effect of hydrogenation upon the caking properties of coal, while Part II, published in 1935, gave a history of the action of the department and its connection with other bodies interested in the subject, and collected together the results obtained in the earlier investigations. The present paper, forming Part III, gives an account of the development of a small-scale plant for the continuous hydrogenation of coal in the liquid phase.

The modern process of coal hydrogenation has for its objects the conversion of coal into oils suitable for the various purposes for which petroleum oils are at present used. The first step in the process consists in the treatment of the coal in a liquid-phase stage, the liquid product from which is separated by distillation into a spirit fraction, a middle oil fraction, and a heavy oil fraction. The spirit fraction can be refined to give motor spirit, the heavy oil is used for making a fresh batch of coal into a paste, and the middle oil is given further treatment in a vapour-phase stage to complete the conversion into suitable oils.

The plant described in the report effects only the first stage of the process—the liquid-phase stage. It was evolved as a natural consequence of work previously carried out in other types of apparatus, which provided a considerable amount of information of value for the present design. Briefly, the essential part of the plant (which treats 28 lb. of coal per day) is the reaction chamber, or converter, consisting of a vertical cylindrical vessel of 3½ in. bore and 35½ in. internal height. The ground coal, made into a paste with heavy oil derived from the process, is injected into the base of the converter and fills it to a level determined by an overflow pipe. Compressed

hydrogen at a pressure of 200-250 atmos. enters by the same pipe as the paste and after passing through the paste is removed from the top of the converter, taking with it a part of the oil produced. The remainder of the product is recovered from the material (the sludge) passing down the overflow pipe. The temperature maintained in the converter is of the order of 450° C.

A detailed account is also given of certain selected features of the plant and of the difficulties experienced during the development stages.

Considerable trouble had been experienced with internally-heated vessels in the development stages, and in the final design the converter was externally electrically heated. The converter was made of chrome-molybdenum steel and was provided with a liner of Staybrite. The hydrogen and oil vapours leaving the converter passed first to a high-pressure fractionating column designed to separate the oil into a heavy fraction suitable for making the coal paste and a lighter fraction to go forward to the next stage of the process—the vapour-phase stage. Details are given of the degree of separation effected under various conditions of operation.

The report draws attention to the importance of the problem of recovering the heavy oil from the sludge, and a detailed description is given of the solution of this problem.

Various difficulties due to corrosion by chlorine compounds have been experienced, as well as obstructions due to the deposition of ammonium salts, principally the carbonate and chloride. The latter difficulty was overcome by injecting water intermittently at appropriate points.

The method of operating the plant to obtain quantitative information is described, and to illustrate this actual figures are given for an investigation of the influence of the composition of a range of different coals.

Modern Laboratory Equipment

A Brief Selection Chiefly of Interest to the Organic Chemist

THE practical work of the organic chemist is now aided by a variety of types of apparatus. Some are labour-saving in character, and some provide a greater degree of safety against the hazard of breakage or explosion. In other cases the study of certain reactions, such as high pressure catalysis, is made easy.

Glassware with standard interchangeable ground glass joints (Fig. 1) is now gaining favour. The general adoption of this type of apparatus has been accompanied by an increased use of glass which is more resistant to temperature changes, i.e., pyrex and monax, ordinary soda glass being unsafe in joints which are subject to considerable fluctuations in temperature. A large selection of joints is now available for the assembly of apparatus to meet the varied requirements of the organic laboratory. Cup joints, for example, provide for a mercury or oil seal. Cool joints have been specially designed to overcome the difficulty of maintaining a satisfactory vacuumtight seal at high temperatures. In this type of joint, while hot gas or liquid flows through an inner tube the actual joint remains comparatively cool and the lubricant retains its

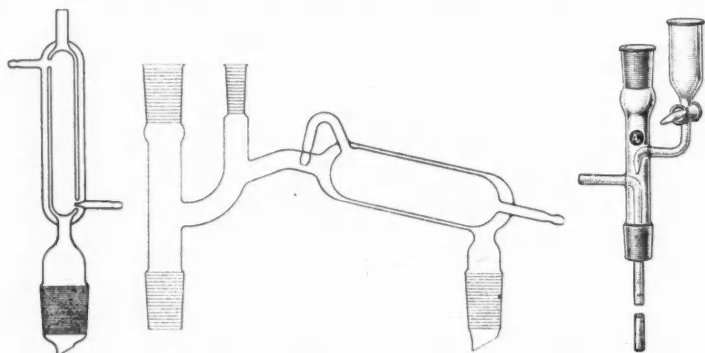


Fig. 1. Three examples of laboratory glassware, with standard interchangeable ground glass joints, supplied by A. Gallenkamp and Co., Ltd. Left, double surface condenser; centre, Claisen pattern stillhead and condenser; right, flask head with tap funnel and separate gas delivery tube.

consistency and cannot contaminate the product. Flat-flange joints are particularly useful for high-vacuum work as they eliminate the risk of joint seizure.

With a lavish range of fittings, including stoppers, adapters (single and multiple), still heads, receiver adapters, stirrers, thermometers, fractionating columns, stop-cocks and high vacuum taps, the erection of apparatus in the organic laboratory is facilitated to an impressive degree. Even in the everyday operations of the organic chemist, the labour-saving aspect of standard interchangeable ground glass equipment is constantly appreciated. No less certain, however, if less calculable, is the stimulus to original work by the opportunity for a rapid assembly of novel experimental schemes.

Fused silica is the laboratory aristocrat of constructional materials. Basins in translucent or transparent fused silica are available in sizes from 20 ml. to 200 ml.; the translucent grade is only a fraction of the price of the transparent grade. Translucent silica beakers are obtainable with capacity from 25 to 1,500 ml. Fused silica combustion tubes are obtainable with a glazed surface in lengths of 24 to 30 inches. These tubes do not sag or distort at ordinary combustion temperatures. The attachment of lead-in tubes is rendered trouble-free by the fact that the tubes are supplied with ends which are fused smooth and perfectly round. A welcome innovation is a tube with a 4 in. section of transparent quartz to allow of the inspection of combustion boats during use; this window can be located at any desired part of the length. A valuable addition is provided by silica tubes—glazed or unglazed—spirally grooved externally for electrical heating (Fig. 2).

Filters constructed entirely of glass now dispense with filter papers. Such filters are resistant to all chemical reagents excepting hydrofluoric acid and hot concentrated alkalis. The filter discs are made from Jena glass softening

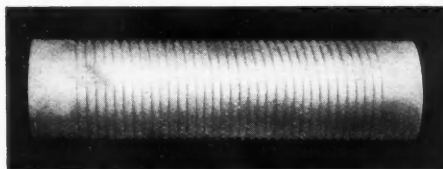


Fig. 2. A Vitreosil tube supplied by the Thermal Syndicate Ltd. in any bore or length with spiral grooving of minimum pitch 1 1/10 in.

at 600° C., which is ground to powder-like particles of a definite size (depending upon the porosity required), and heated to the sintering point without admixture of any other substance. These discs, in turn, are fused direct to Jena glass containers to form funnels, crucibles, extraction thimbles, etc. A range of seven porosities is produced, from 500 microns (useful for low pressure gas distribution in liquids) to 1.5 microns (bacteriological filtration); diameters range from 1 to 18.5 cm.

Apparatus for High-Pressure Reactions

Several types of laboratory apparatus for the study of high-pressure reactions have been introduced during recent years, but their use has been somewhat restricted by the fact that each pattern was designed for a specific purpose, such as ammonia synthesis (Badische Anilin and Soda-Fabrik), acetaldehyde condensation (Atkins, Kinsey and Folkers), and gaseous reactions (Fischer and Tropsch). It is therefore of general interest that apparatus is now obtainable in which nearly all types of high pressure reactions can be studied, irrespective of whether they involve gaseous components alone or light or heavy liquids in any desired proportions. This apparatus is available in three sizes, suitable respectively for maximum pressures of 200, 400 and 800 atmospheres. The maximum permissible reaction temperature is 500° C.; the catalysis chamber of the reaction vessel has a capacity of 30 ml. The essential parts include a compressor, two pumps (applicable either for liquids or gas circulation), a reaction vessel, a pressure cooler and a pressure reducer. The actual reaction

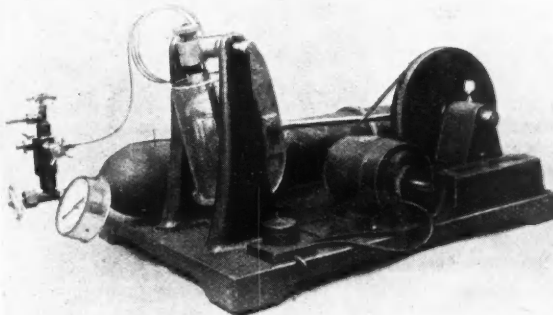


Fig. 3. The latest type of laboratory catalytic hydrogenation apparatus made by W. Edwards and Co.

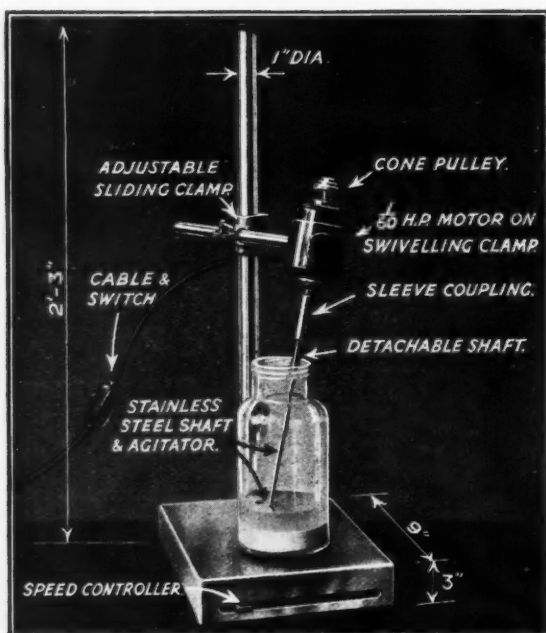


Fig. 4. A portable laboratory stirrer made by L. A. Mitchell Ltd.

vessel is suspended in an electric furnace, and the reactants are mixed by circulation of the gaseous components.

A less elaborate apparatus of different design, which should

prove extremely useful for catalytic experimental work at ordinary temperatures, is here illustrated (Fig. 3). Oscillating motion can be imparted by a motor-driven shaft to the reaction vessel which can be an inexpensive thick glass container for work involving pressures of not more than about 7 atmospheres, but is otherwise made of steel for high pressures. A soled bronze rocking frame holds the reaction vessel. Although primarily designed for the study of catalytic hydrogenation, this apparatus is adaptable for work with most other gases. The pressure gauge which is provided, makes it easy to calculate the weight of hydrogen (or other gas) taken up in the course of the reaction by noting the change of pressure.

Portable motor-driven stirrers are useful in all chemical laboratories. An agitating device capable of efficiently mixing as much as 4,000 ml. of liquid is often especially desirable for organic preparations. One such device (Fig. 4) is operated by a 1/60 h.p. motor, and is complete with switch and plug for connecting to any ordinary lamp socket. The inclination of the stirrer can be altered by means of a swivelling clamp on the motor, which, in turn, is attached to a stand by an adjustable sliding clamp; in addition there is a speed controller. A rather more elaborate outfit (Lang, London, Ltd.) possesses some useful features. The motor (1/4 h.p.) is more powerful and movement up and down the steel column is facilitated by an internal counterweight. A variable speed controlling device permits speeds of 700 to 6,000 r.p.m. One of the accessories which should appeal to the organic chemist is a 3-bladed collapsing agitator, 3 1/2 in. diameter, capable of passing a three-quarter inch aperture. A whisk and a 2-bladed rigid propeller-shaped agitator are also obtainable and each stirring device is attached to a stainless steel spindle which reduces possible contamination to a minimum.

Unglazed, Impervious Ceramic

Suitability for Laboratory Construction

AN unglazed ceramic body suitable for the manufacture of sinks to withstand heavy duty, has been developed at the Mellon Institute by Phillips and Marbarker (*Jour. Amer. Ceram. Soc.*, 1938, 21, 134-143). The basic ceramic mix is composed of 70 per cent. grog (60-80 mesh), 9 per cent. slip clay, 20.7 ball clay, and 0.3 per cent. of organic material, such as wood flour, to give the mass a porous structure when fired. The mass is dried first at room temperature, and then at 85° C., and is finally fired at 1,025° C., after moulding under pressure. The fired object is then impregnated with a mixture of equal parts of asphalt and pitch, at 210° C., this being the temperature of greatest fluidity and of least decomposition of the impregnant. Ignition of the carbonaceous material is carried out in a gas tight container at 400-500° C., until all distillation has ceased, an operation requiring about 72 hours, after which the article is allowed to cool slowly during 48 hours. In this way all the pores of the body are completely filled with a deposit of dense coke, rendering the finished object quite impervious to water, so that it requires no glaze. For special purposes, particularly if a coloured body is required, impregnation may be done with sulphur or an organic resin.

The ceramic body thus produced is lighter than most materials used for sink construction (its specific gravity is 1.87) and is said to be quite as strong as any of them. Its surface is smooth, and can be polished if required. It is unattacked by any acid except HF., and the surface is only slightly etched by strong alkalis.

It is considered to be especially suitable for laboratory constructional work on account of its great strength, but should find numerous other applications. Among the uses suggested for it are the manufacture of sinks, shelves, tanks, pipes and pipe fittings, and, when impregnated with a suitable synthetic resin, for the construction of switchboard panels.

New Sulphanilamide Derivatives

Of Use both in Bacterial Infections and in Virus Diseases

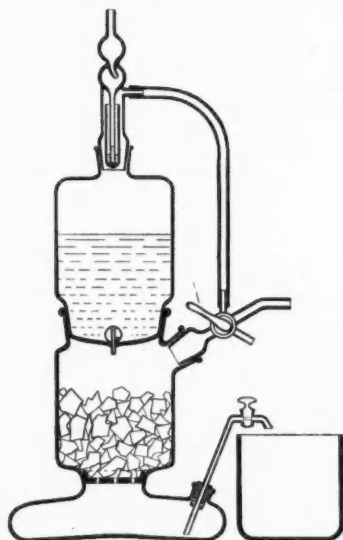
WHILE sulphanilamide has been demonstrated to be a very valuable drug in medicine, it is far from being all-sufficient. The aim of investigators in both chemical and medical research is to find new compounds which will be more effective and less toxic than sulphanilamide. M. L. Crossley, E. H. Northey and M. E. Hultquist, of the Calco Chemical Company, in a paper presented before the division of Medicinal Chemistry at the ninety-fifth meeting of the American Chemical Society, on April 20, described how they have synthesised a large number of compounds of the sulphanilamide family and found many of them to be more effective than the parent substance in experimental infections with beta hemolytic streptococci in mice. Whereas about 20 per cent. of the mice treated with sulphanilamide under the conditions of the experiment died, there were no deaths with several of the new derivatives.

Among the compounds found to be effective the most important are: N-methyl disulphanilamide, N-ethyl disulphanilamide, sodium 2-sulphanilamidobenzoate, sodium 2,4-bis sulphanilamidobenzene sulphonate, 2,5-bis sulphanilamidobenzene sulphonic acid. The results to date indicate that these products may prove to be not only of interest in combating bacterial infections but also in combating virus diseases. Of the group the 2,5-bis sulphanilamidobenzene sulphonic acid is the most promising because it appears to give 100 per cent. protection against streptococcal infections in mice and in addition shows marked protective action against experimental influenza in mice. This compound is the union of two sulphanilamides with one benzene sulphonic acid and its structure is indicated by the following formula: $(\text{NH}_2\text{C}_6\text{H}_4\text{SO}_2\text{NH})_2\text{C}_6\text{H}_3\text{SO}_3\text{H}$. It is too early to say that this result will be duplicated in human influenza.

New Gas Generator

Air-free Gas Stored under High Pressure

A NEW form of apparatus for gas generation, supplied by the Scientific Glass Blowing Co., possesses the following features, *inter alia*:—The generated gas is air free, the acid is thoroughly washed and saturated with the generated gas, fresh and used acid cannot mix, the gas is generated at unusually high pressures, with obnoxious gases work in the fume cupboard is unnecessary, and the generator can be cleaned and recharged without dismantling.



It will be seen from the diagram that the apparatus consists of two main vessels, the generating material, e.g., marble, being placed on a small dish in the lower vessel, and the upper vessel charged with acid. The vessel at the base of the apparatus is filled with air-free water. At the bottom of the upper vessel there is an automatic drop valve consisting of a capillary tube, and a hollow sphere with an opening. On opening the main tap acid drips into the lower vessel and gas is generated. The tap is

closed directly the gas forces the acid in the hollow sphere back into the upper vessel and by means of the opening the gas bubbles through the acid in the upper vessel. By bringing the tap into the position connecting the upper vessel with the atmosphere the gas escapes or is led by rubber tubing into the fume cupboard. The action of generating and discharging is repeated several times so that the space above the acid in the upper vessel is charged with gas and the acid itself thoroughly washed and saturated.

In effect, the apparatus is a gasholder, with gas stored in both the upper and lower vessels, and a pressure up to a water column pressure of a metre is attained. The pressure of gas does not depend upon the height of the acid charge as in the usual form of generator, but on the height of the mercury column in the safety valve situated at the top of the upper vessel. This valve consists principally of a mercury manometer with a double bulb safety trap above it. The generator is completely sealed, so that diffusion of air in the gas or acid is impossible.

Ten Years Back

From "The Chemical Age," April 28, 1928

Indian indigo exports in February amounted to 176 cwt., compared with 54 cwt. in the parallel period last year.

* * * *

The Annual Meeting of the Federation of British Industries was held in London on Wednesday, when Sir Rowland Blades, ex-Lord Mayor of London, was elected president in succession to Lord Gainford.

* * * *

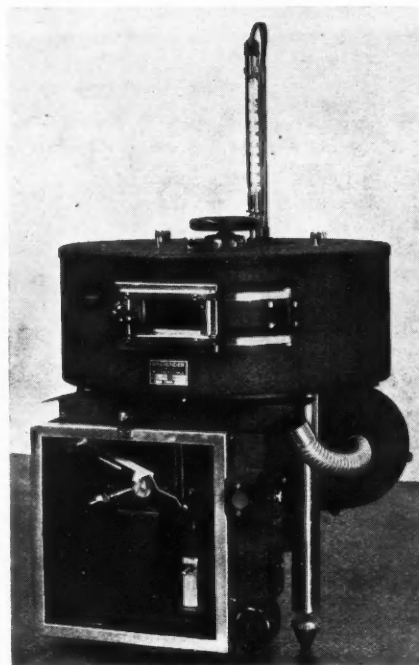
Revised estimates of the production of calcium cyanamide in Germany made by Dr. N. Caro place the annual productions at 100,000 tons of nitrogen content. Production at Piestritz is estimated at 42,000 tons of nitrogen per year, at Trostberg-on-Inn 47,000 tons, Waldshut 10,000 tons, and Hirschfelde and other smaller plants 1,000 tons.

New Moisture Tester

Apparatus for Rapid and Accurate Results

A NOVEL moisture tester for factory, laboratory and research work, recently brought on the market, is said to combine speed of determination with the accuracy of the analytical method. In operation a small motor-driven fan draws air into an electrically heated pre-heating chamber, and forces the hot air into a cylindrically shaped drying chamber which is arranged immediately above. The hot current of air is uniformly distributed throughout the drying chamber (by means of an asbestos plate) and is regulated in such a way that no particles of the testing material can be removed. The moisture is absorbed by the current of air and is removed through three air ducts, which are arranged in the cover of the drying chamber.

A certain definite quantity, usually about 10 grams, of the testing material is weighed out in each of the weighing dishes and each dish is then placed through a double walled glass door on a revolving tray in the drying chamber. 10 or 15



The new moisture tester made by Brabender, O.H.

dishes are placed on this plate, which is turned by means of a handwheel. Each dish can be weighed separately in the drying chamber by means of an oil damped balance arranged beneath the chamber in a dust-proof casing. The chamber is insulated to prevent heat losses and the heat is controlled by means of an adjustable contact thermometer and a mercury switch, permitting temperature control within very close limits. The balance is specially calibrated to indicate the loss of weight, *i.e.*, the water content, in percentages. A system of mirrors and lenses projects the figure on an illuminated scale.

The incorporation of a fan and precision balance in the apparatus makes for rapid results and the uniform temperature in the drying chamber for accuracy. The apparatus is made by Messrs. Brabender O.H., of Duisberg, Germany, for whom Mr. H. K. Voss, of 48 St. Maur Road, London, S.W.6, is acting agent for the United Kingdom.

The Aluminium-Industrie A.G., of Neuhausen, has declared a dividend on last year's trading of 10 per cent. (previously 7½ per cent.) on the 60 million francs of share capital. Net profit rose from 5.07 to 7.70 million francs.

COMPANY MEETING.

The British Drug Houses, Ltd.**Considerable Rise in Turnover—Mr. Charles A. Hill's Speech**

The Annual General Meeting of the shareholders of The British Drug Houses Limited, was held on Monday, April 25, at 21 Tothill Street, Westminster, S.W.

Mr. Charles Alexander Hill, B.Sc., F.I.C. (chairman and managing director), presided.

The Chairman said: As is shown by the figures in the profit and loss account, there is a rise of some £6,000 in the trading profit; of this about £300 is absorbed by the larger amount for amortisation and depreciation, and about £4,300 by increased provision for income tax and for National Defence Contribution.

After making increased provision for amortisation and depreciation, and income tax, allowing for N.D.C. and paying the larger amount for preference dividend, the available balance is £51,946, which is £450 more than the previous year. It will be seen that the allocation recommended by the directors is similar to that for 1936, the dividend on the ordinary shares being maintained at 6 per cent., and £7,500 placed to the reserve fund, bringing this up to £95,000.

The increase of about £4,400 in the investment in our two subsidiary companies is justified by the satisfactory progress made by these companies, each of which has shown an increase in both turnover and profits.

Improved Export Business

The improvement in our business in export markets applies not only to our Australian and Canadian companies, but to every market throughout the British Empire, and also to many of the foreign countries with which we trade. In the latter countries, however, exchange difficulties and trade restrictions still constitute an obstacle; as conditions improve in one direction they may be counter-balanced by fresh troubles elsewhere. The increase in export business was not confined to one class of goods but extended to all sections of our business, and is attributable to an improvement in both demand and trading conditions generally.

Vitamin E

On former occasions I have referred briefly to the work of your company in the field of hormones, vitamins, and biochemical products generally, which substances continue to play an increasingly important role in progressive medicine. It will be of interest to mention that much of the recent work carried out in this country upon the physiological activity of vitamin E has been performed in our laboratories, and as a result of this the probable therapeutic application of vitamin E in the human subject is becoming established.

Our developments on the biological side include the installation of greatly improved and thoroughly up-to-date biological and bacteriological laboratories for research and testing; and in association with these we have constructed a larger department for making vaccines and immunological products. These provisions still further strengthen that highly important section of our business relating to medical and scientific products to which I referred last year.

"British Drug Houses Fellowship"

As a natural corollary to our policy of developing our activities in the biological field, I am happy to announce that your company has recently instituted a research fellowship, known as the "British Drug Houses Fellowship," tenable at University College Hospital, London, to enable a medical graduate, and a technical assistant, to carry out investigations upon the clinical application of hormone preparations under the personal direction of the Professor of Gynaecology and Obstetrics.

The object of the B.D.H. research fellowship is to obtain detailed knowledge of the technique of application of hormone products in the various gynaecological and obstetric conditions associated with endocrine deficiency, and also to promote closer collaboration between the scientific workers in our own biological and chemical laboratories and those working in the purely clinical field.

Plant Hormones

One of the company's minor activities has been the manufacture of certain chemical substances which stimulate and control the growth and division of plant cells and root formation—the so-called "plant hormones." Practical trials carried out at the Royal Botanic Gardens, Kew, the Royal Horticultural Society's Gardens, Wisley, and at other research stations have shown that cuttings of many plants, by absorbing the "hormones" from very weak solutions, are stimulated to form vigorous roots in a comparatively short time. These growth-stimulating substances, by assisting the successful striking of cuttings from plants or shrubs, are already of great interest and value to professional and amateur gardeners, and may well become of considerable importance in agriculture and horticulture.

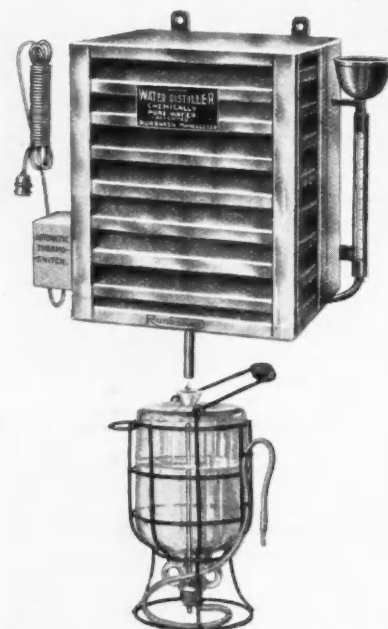
I will now say a word about staff matters. It may interest you to know that your company now gives employment to more

Benzoic Acid as Preservative**Influence of pH on Efficiency**

IT has long been known that sodium benzoate and salicylate are poor preservatives as compared with the acids, whether the acids are incorporated as such or produced by the acidity of the menstruum. The effect of acidity upon the antiseptic properties of benzoic acid has been thoroughly investigated by R. H. Goshorn, E. F. Degering and P. A. Tetrault. From the results of the study set out in a paper presented at the recent meeting of the American Chemical Society, it is apparent that benzoic acid is most effective in an acidic medium, preferably with a pH of 4 to 6, and that it is practically worthless as an antiseptic against either *staphylococcus aureus* or *bacterium coli* in even slightly alkaline solution.

The effects of various salts were studied. Solutions of sodium chloride, potassium chloride, calcium chloride, sodium nitrate, and sodium sulphate were ineffective as antiseptics against these organisms even in concentrations of the order of 5 to 10 per cent. It is apparent, therefore, that the amount of any of these salts present in food preparations which are stabilised with benzoic acid are without effect, and the medium must be acidic if the product is to be properly preserved.

The maximum dilutions at which benzoic acid solutions will function effectively as bactericides or as antiseptics were determined at various pH values, using *bacterium coli* and *staphylococcus aureus* as test organisms. The results indicate that the effectiveness of benzoic acid increases to a maximum with an increase in the hydrogen ion concentration, and that relatively small concentrations of extraneous ions introduced to adjust the pH were not sufficient to vitiate the results.



A new water distiller introduced by Runbaken Electrical Products. Its capacity is 2 gallons with an output of approximately 1 pint per hour. The still can be re-filled while in operation, a gauge glass indicating the quantity of water in the still. It is entirely automatic in action and switches off when allowed to run dry.

than 1,500 persons. It is once more my pleasant duty to give expression to the directors' appreciation of the services rendered by the whole of the staff, both at home and abroad, who work loyally and efficiently to promote the best interests of the company.

The Report was unanimously adopted and the proceedings terminated with a vote of thanks to the Chairman and Directors.

Personal Notes

MR. CHARLES POLLOCK, of Paisley, soap manufacturer, who died on February 11 last, has left personal estate valued at £8,745.

PROFESSOR MAX PLANCK, the famous German physicist originator of the quantum theory, celebrated his eightieth birthday last Saturday.

MR. RUDOLPH BULER has been appointed a director of Amalgamated Metal Corporation, Ltd., in place of Dr. A. E. R. Martin, who has resigned.

SIR GILBERT MORGAN, director of the Chemical Research Laboratory, Teddington, is to receive the honorary degree of LL.D. of the University of St. Andrews.

MR. LEOPOLD ALBU, chairman of the Phoenix Oil and Transport Co. and Phoenix Oil Products, Ltd., left estate valued at £374,115 (net personalty £346,579).

MISS EVELYN MARIE JEANETTE DUPRE has been awarded a Civil List pension of £75 per year in recognition of the scientific services rendered by her father, the late Dr. A. Dupré, F.R.S.

MR. C. P. PEDDLE, of St. Helens, has been elected president of the Society of Glass Technology, in succession to Professor W. E. S. Turner, of Sheffield University. Dr. Peddle was one of Professor Turner's first research students at Sheffield thirty years ago, then being a student in the physical chemistry department.

SIR HAROLD HARTLEY has again been elected chairman of the British National Committee of the World Power Conference, to serve for a further term of three years. Sir Harold is vice-president of the London, Midland and Scottish Railway Co. and chairman of the Fuel Research Board, Department of Scientific and Industrial Research.

MR. H. COURTNEY BRYSON is in future devoting the whole of his time to the interests of Scott Bader and Co., Ltd., raw material suppliers to the paint, varnish, lacquer and allied industries. The laboratory, of which he is in charge, is being extended and equipped to deal with all questions arising from the application of products sold by the company.

EMERITUS PROFESSOR S. J. TRUSCOTT has been awarded the gold medal of the Institution of Mining and Metallurgy in recognition of "his services in the advancement of the science and practice of mining and metallurgy with special reference to his services in technological education." PROFESSOR H. V. A. BRISCOE has been awarded the Consolidated Gold Fields of South Africa, Ltd., gold medal for his researches on the sampling and properties of industrial dusts, and the company's premium of forty guineas has been awarded jointly to Dr. Janet W. Matthews, Mr. P. F. Holt and Miss Phyllis Sanderson, for the work carried out with Professor Briscoe.

OBITUARY

HERR ARTHUR KRUPP, head of the Austrian Krupp family and who established the metal works at Berndorf, has died at Vienna, aged 82.

MR. JOHN BROWN, founder of the firm of John Brown and Co. (Bradley Fold), Ltd., bleachers, which was founded in 1900, has died at the age of 72.

SIR STANLEY BOIS, chairman of the Rubber Growers' Association, has died at Frensham, Surrey, at the age of 73. He was chairman of the Ceylon Association in London.

MR. HERBERT WALKER, who retired from the post of stores manager to the Staveley Coal and Iron Co., Ltd., in 1934, has died at Chesterfield, aged 56. He won the amateur billiards championship in 1913.

MISS ROSE ELIZABETH SQUIRE, who was one of the first Home Office women inspectors of factories, retiring in 1926 after thirty years' service, has died at Ingatestone, Essex, at the age of 76. She was director of women's welfare at the Ministry of Munitions from 1918 to 1919.

MR. WILLIAM FREDERICK WHITE, one of the earliest members of the Mining and Metallurgical Club, was buried at Abney Park Cemetery, Stoke Newington, on April 19. His age was 74.

MR. T. EDWARD LESCHER, managing director of Evans Sons, Lescher and Webb, Ltd., manufacturing chemists of Liverpool, died following an accident while skating at an ice rink in Liverpool last Saturday. He was born in Hampstead, London, in 1877, and was the elder son of Mr. F. Harwood Lescher, who, in 1828, in partnership with Mr. John Evans, founded in Liverpool the firm of Evans and Lescher which later became known by the present longer title. During the war, he was made responsible for the supply and control of drugs needed by the public, under the National Health Insurance Commission, and was awarded an O.B.E. at the close of hostilities. He was elected chairman of the Liverpool Chamber of Commerce in 1935, and he was also a member of the executive committee of the Association of Chambers of Commerce. He was a Freeman of the City of London and a member of the Grocers' Company. He served as honorary auditor of the Pharmaceutical Society and as honorary treasurer of the British Pharmaceutical Conference; and he was a fellow of the Chemical Society. He was an expert skater and held the gold medal of the National Skating Association, in addition to being a member of the Association's Council.



Mr. T. Edward Lescher.

MR. H. M. N. HOTOPF, joint managing director of J. M. Steel and Co., Ltd., chemical merchants, died on April 24 at Bühlerhöhe, Baden-Baden. Mr. Hotopf, who was born in Newcastle in 1881, joined the Badische Anilin- und Soda-Fabrik in 1906 and was transferred to London in 1912. In 1916 he went into partnership with the late Mr. A. P. Stott, forming the firm of Stott and Hotopf and, except for a period of two years when he served his country during the War, continued in this partnership until 1926, his interests then being merged in those of J. M. Steel and Co., Ltd.

DR. BERTRAM PRENTICE, former Principal of the Royal Technical College, Salford, has died at the age of 71. Dr. Prentice was born in Edinburgh, and began his early education at George Watson's College and the Heriot-Watt College. He entered Edinburgh University, where he graduated as B.Sc. in 1893, and was awarded the Baxter Fellowship in experimental science in 1894. He received the doctorate of science of Edinburgh and the doctorate of philosophy of Munich university. In 1896 he was appointed head of the chemistry department of the Salford Technical College, and became principal in 1909, holding the post until 1932, when he retired.

From Week to Week

The Chemical Age Lawn Tennis Tournament Entries Close on Tuesday

Only three days remain for competitors to enter for THE CHEMICAL AGE Lawn Tennis Tournament, details of which were published on April 2. Entries must be sent in by Tuesday next (first post). The tournament, for which there is no entrance fee, comprises men's singles and doubles, open to members of the chemical industry throughout Great Britain, either as principals or members of staffs. THE CHEMICAL AGE silver challenge cups are held by the winners for twelve months, and statuettes are presented outright to the winners and runners-up.

Immediate application should be made for full particulars and entry forms to The Editor, THE CHEMICAL AGE, Bouverie House, 154 Fleet Street, London, E.C.4. (Telephone: Central 3212).

MESSRS. R. AND A. MAIN, GOTHIC IRONWORKS, are to build a new mill within their works at Camelon, Falkirk, at an estimated cost of £2,500.

THE GENERAL ASSEMBLY OF THE ALUMINIUM INDUSTRIE NEUCHÂTEAU, Switzerland, has decided to build a branch factory at Newport, Monmouthshire, in which the aluminium clay will be worked.

THE RUMANIAN REDEVENTZA Co. has been granted by the Portuguese Government an exclusive concession for ten years for oil refining. The Redeventza Co. is to form a Portuguese company over a third of which the Government holds an option.

PUBLICATIONS OBTAINABLE FROM ADAM HILGER, LTD., concerning spectrum analysis by emission and absorption spectra, and its application in research and control of chemical, metallurgical and bio-chemical processes, are listed in a leaflet just issued.

FORTY FURNACES HAVE BEEN CLOSED DOWN in the first complete section of the British Aluminium Co.'s new factory at Inverloch, as a result of a dispute over the duties of furnacemen. The matter is being considered by the Scottish Transport and General Workers' Union.

MARSHALL, SONS AND CO. (SUCCESSORS), LTD., have just issued a new publication giving examples of the steel fabrication carried out by them. The booklet illustrates and gives short descriptions of typical plant under construction in the company's works and of finished riveted and welded work.

WITH AN INCREASE OF 36 PER CENT. over 1936, production of sulphur in the United States in 1937 established a new peak of 2,741,970 long tons according to the United States Bureau of Mines. Record shipments of 2,466,512 tons valued at \$44,300,000 were also recorded for the year compared with 1,968,820 tons valued at \$35,400,000 in 1936.

THE IRISH AGREEMENT signed on Monday deals with defence and finance, as well as embodying a trade agreement. The trade agreement provides for the continued free entry into the Irish Free State of British goods (including numerous chemical products) which at present enter duty free. It is also undertaken to remove or reduce the Customs duties on certain classes of British products. The products specified are of little interest to the chemical trade.

THE DEPARTMENT OF OVERSEAS TRADE announces that Mr. J. L. Wilson Goode, H.M. Trade Commissioner at Vancouver, is at present in the United Kingdom on an official visit. Mr. Wilson Goode will be available at the Department of Overseas Trade for the period May 11 to 13 for the purpose of interviewing manufacturers and merchants interested in the export of United Kingdom goods to Alberta and British Columbia after which he will, until the end of May and again later in the year, visit some of the more important industrial centres in the provinces. Firms who desire an interview with Mr. Wilson Goode in London or who wish to obtain information regarding his arrangements to visit the provinces should apply to the Department of Overseas Trade, 35 Old Queen Street, London, S.W.1, quoting the reference 20872/38. The Department also announces that Mr. W. D. Lambie, H.M. Trade Commissioner at Trinidad, is at present in the United Kingdom on an official visit. Mr. Lambie will be at the Department of Overseas Trade on Monday, May 23, for the purpose of interviewing manufacturers and merchants interested in the export of United Kingdom goods to the British West Indies (except Jamaica), British Guiana and Bermuda, after which he will undertake a short tour of some of the more important industrial centres in the provinces. Firms who desire interviews with Mr. Lambie in London or who wish to obtain information regarding his arrangements to visit the provinces should apply to the Department of Overseas Trade, 35 Old Queen Street, London, S.W.1, quoting the reference 21123/38.

ALUMINIUM ANNEALING AND HEAT-TREATMENT is described in great detail in a brochure (No. 391H) published by The British Aluminium Company, Ltd.

MODERN METHODS OF BRICK AND TILE COLOURING is the subject of a paper by Dr. Felix Singer, published in the "British Clayworker," February, 1938.

FIRE DAMAGED THE CANTEN AND SPORTS CLUB PREMISES at the Crumpsall Vale works of Imperial Chemical Industries, Ltd., Blackley, Manchester, early on Sunday.

THE D'ARCY EXPLORATION CO., LTD., has "struck" a considerable quantity of natural gas in its Cousland No. 1 test well, near Dalkeith, Midlothian. The gas was encountered in sandstones of the oil shale group extending from a depth of 1,582 ft. to 1,640 ft. from the surface. Short tests of the upper and lower sections of this zone have indicated an initial gas production of at least 4,000,000 cu. ft. per day.

THE INTERNATIONAL TIN RESEARCH AND DEVELOPMENT COUNCIL has published its second report. Attention is concentrated upon the tinning and canning industries, and new methods for measuring the thickness of the tin coating have been devised, and the council has also patented a process of electro-depositing tin on tinplate. Some new alloys, the report states, are substantially stronger than any pewter at present in use and possess ample ductility.

LONG SERVICE AWARDS WERE PRESENTED TO 265 EMPLOYEES of Lever Brothers (Port Sunlight), Ltd., by Lord Leverhulme, on April 22. Since the establishment of these awards 2,391 have been made to employees with 25 years' service and 7,826 to those with 15 years. Earlier in the day Lord Leverhulme presented 86 watches to the sons and daughters of employees of the company who have joined their parents in working for the company and who have completed one year's service.

CROFTS (ENGINEERS), LTD., draw attention to various devices they manufacture which may be utilised to secure the greater safety of workpeople and which cover the provisions of the Factory Act, relating to moving parts of machinery. These devices include friction clutches, various types of guards for shafting, belting, gears, etc., belt shifting gears (hand-operated and single pull types), and safety collars for covering gib head keys. They are described in leaflets issued by the company.

OUTPUT OF THE CORNWALL AND DEVON CHINA CLAY INDUSTRY during March, was 22,847 tons below that of the corresponding month of 1937. Fowey accounted for 22,696 tons of the decrease and Par for 1,012 tons, but the total for Charlestown was an increase of 1,377. The total output figures were made up as follows: china clay 59,888 tons, china stone 2,414, and ball clay 1,979. Exports of china clay alone during March amounted to 35,314 tons, as compared with 37,304 tons in March of last year. Tonnage carried by rail was 5,737, compared with 5,795 in March, 1937.

THE FOUNDATION STONE OF THE NEW £30,000 TANNERY at Haverigg, near Millom, Cumberland, was laid by Mr. Frank Anderson, M.P., yesterday. Considerable assistance is understood to have been rendered under the Government Special Areas scheme and from the Nuffield Trust. The tannery is being built for Hamilton Palmer, Ltd., West Coast Tannery Co., of London, and is expected to be completed in six months. Much of the work in connection with arranging for the tannery to be built at Haverigg, was done by the late Mr. William Findlow Sadler, a special director of Vickers-Armstrong, Ltd.

AT THE ANNUAL GENERAL MEETING of the Society of Glass Technology held in Sheffield recently, Mr. C. J. Peddle, M.B.E., D.Sc., F.I.C., F.Inst.P., F.S.G.T., was elected President of the Society in succession to Professor W. E. S. Turner, O.B.E., D.Sc., F.R.S., F.Inst.P., F.S.G.T., who was appointed honorary secretary. Mr. F. G. Orme, O.B.E., F.C.I.S., was re-appointed honorary general treasurer, and Mr. F. C. Flint, B.Sc., F.S.G.T., honorary American treasurer. Other vacancies arising owing to retirement according to the society's rules were filled as follows: Vice-Presidents, Graham Cunningham, and J. H. Hogan; Ordinary Member of Council, A. Bunce, and A. Garstang, J. B. Murgatroyd, M. Parkin, J. H. Partridge, E. Seddon, and F. Winks.

THE VIENNA SECTIONAL MEETING of the World Power Conference will, notwithstanding recent political events, be held between the dates already fixed (August 25-September 2, 1938) the programme remaining unaltered, it is announced officially. Herr Ing. R. Reich, the chairman of the former Austrian National Committee, and his colleagues, have been asked by the German National Committee to continue their preparations for the holding of the Sectional Meeting, which will be organised from Vienna itself. At the recent Annual General Meeting of the British National Committee, it was decided unanimously to proceed with preparations for British participation in the Vienna Meeting. The Annual Report of the World Power Conference for the year 1937 has now been issued and copies will be supplied upon application to the British National Committee of the World Power Conference, 36 Kingsway, London, W.C.2.

THE UNITED STATES GOVERNMENT has refused to reconsider its decision to reject the German request for 10,000,000 cu. ft. of helium.

MR. HARRY LANE, Chairman and Managing Director of Modern Fuels, Ltd., lighted twenty-four ovens, representing nearly half the first unit, at the low-temperature carbonisation works of the company, at Seaham Harbour, County Durham, on Monday. Modern Fuels, Ltd., was formed with the assistance of the Nuffield Trust and the Treasury, and took over the works formerly operated by Coal and Allied Industries, Ltd.

THE BULLETIN OF THE IMPERIAL INSTITUTE for the first quarter of the year contains, in addition to regular features, articles on Pyrethrum in Kenya, by V. A. Beckley, M.C., M.A., A.I.C.; The Cashew Nut Industry in Western India, by W. J. Jenkins, M.A., B.Sc., I.A.S.; and The Copper Industry of the U.S.S.R. Reports of recent investigations at the Imperial Institute include: Clarified Butter (Ghee) in Africa, and Comparative Values of Newfoundland Spruce and Fir and Russian Spruce as Sources of Paper Pulp.

THE EGYPTIAN GOVERNMENT has granted four important concessions to work deposits of wolfram near the Red Sea to Mr. J. A. Maller, who is chairman of Anglo-Bulgarian Mines, Ltd., and managing director of Zlot Mines, Ltd., and Bechnia Gold Mines, Ltd.

WATER POLLUTION RESEARCH TECHNICAL PAPER No. 7, issued on Monday by the D.S.I.R., gives a detailed description of the results of a chemical, hydrographical and biological investigation of the effects of the discharge of crude sewage on the amount and nature of the deposits in the Estuary of the River Mersey.

ALPHA CEMENT, LTD., announces that the following have resigned from the board: Sir Arthur H. Marshall, Sir Archibald Mitchelson, Bt., Sir Maurice Bonham Carter, Mr. W. S. Stephenson, Mr. H. Ray Paige, Mr. J. D. Marks, Mr. A. G. Robertson, and the following have been appointed directors: Mr. A. C. Davis, Mr. G. F. Earle, Lieut.-Col. Sir Francis H. Humphreys, Mr. N. M. Jensen, Mr. A. G. Larsen and Mr. G. H. E. Vivian. Mr. A. Y. Gowen has been appointed chairman.

Chemical and Allied Stocks and Shares

SENTIMENT in the industrial and kindred departments of the Stock Exchange has been entirely dominated by the Budget. On Wednesday morning prices showed an all-round reduction, but a rapid improvement developed on mature consideration of the Chancellor's decisions. Although the increase in income tax was not expected in the City, there was general satisfaction that there is no increase in N.D.C. payments.

Shares of chemical and allied companies moved in favour of holders in many cases, although best prices were not held. Imperial Chemical, however, were a rather weak feature, and have declined on the week from 33s. to 31s. 6d. at the time of writing. Distillers were also lower, as were United Molasses and Petroleum Storage and Finance deferred, sentiment in regard to these shares being affected by the duty on power alcohol. On the other hand, Boots Pure Drug at 49s. have held nearly all their rise of the previous week, awaiting the dividend announcement, while Beechams Pills deferred shares were active at 60s., also in advance of the dividend. Timothy Whites and Taylors at 26s. 9d. have not kept all their improvement of the previous week, but Sangers have risen further from 21s. 10½d. to 22s. 9d. at the time of writing.

Associated Portland Cement at 83s. 1½d. are little changed on balance and British Plaster Board continued active around 26s. 3d., but Turner and Newall reacted from 84s. 4½d. to 83s. 9d. British Oxygen at 83s. 1½d. are little changed on the week, pending the results. Cerebos were little changed at 48½ although now "ex" the dividend, the full results having created an excellent impression. B. Laporte have been marked up sharply to 87s. 6d., and the market is talking of an increase in the forthcoming dividend. Greff Chemicals Holdings 5s. units remained at 6s. 3d. British Glues were most active with

business around 5s. 6d., while British Industrial Plastics continued to change hands around 2s. 3d. Barry and Staines at 38s. 3d. held their improvement of the previous week.

Lever and Unilever at 37s. 6d. have reacted, but are now "ex" the final dividend. The increase in the distribution to 10 per cent. for the past year was up to best market expectations; it is being assumed in some quarters that at the forthcoming meeting it may be indicated that further important economies may arise this year from internal adjustments in the group. Fison Packard and Prentice were inactive, but at 34s. 4½d. are virtually the same as a week ago. United Glass Bottle at 50s. 9d. are also little changed. British Drug Houses are a few pence higher at 23s. 9d. under the influence of the statements at the recent meeting. British Aluminium were an active feature around 52s. 3d. General Refractories were fairly steady at 17s. 6d.; the results are expected during the next few days.

International Nickel and other shares affected by the trend of New York markets were reactionary. Iron and steel shares were fairly steady, particularly those of companies with armament activities, sentiment concerning which was influenced by the absence of an increase in the N.D.C. Dorman Long were little changed, and Pease and Partners remained active on anticipations of an increase in the forthcoming dividend. Babcock and Wilcox were firm at 40s. 10d. in response to the good increase in profits shown by the full results.

Oil shares were lowered sharply on the higher petrol tax, but partial recovery was shown later. The interim dividend of Trinidad Leaseholds and the final dividend decisions of the "Shell" and other leading oil companies continue to be awaited with considerable interest in the market.

Forthcoming Events

London.

May 2.—Society of Chemical Industry. Annual General Meeting, followed by Joint Meeting with the Road and Building Materials Group, Burlington House, Piccadilly, W.1. 8 p.m. T. McLachlan, "The Decay of Building Materials through Micro-Biological Agencies."

University College, Gower Street, W.C.1. 5.30 p.m. Professor The Svedberg, "Molecular Migration under the Influence of Centrifugal, Osmotic and Electric Forces: Investigations on Proteins."

Royal Institution, 21 Albermarle Street, W.1. 5 p.m. Annual Meeting.

May 3.—Institution of Civil Engineers. Great George Street, S.W.1. 5 p.m. Presentation of Kelvin Medal. 6 p.m. Sir Frank E. Smith, "Disorderly Molecules and Refrigerating Engineering." Presentation of James Alfred Ewing Medal.

University College, Gower Street, W.C.1. 5.30 p.m. Professor The Svedberg, "Molecular Migration under the Influence of Centrifugal, Osmotic and Electric Forces: Investigations in other Systems."

May 4.—Society of Public Analysts. Burlington House, Piccadilly, W.1. 8 p.m. Ordinary Meeting.

The Institute of Metals. The Institution of Mechanical Engineers, Storey's Gate, Westminster, S.W.1. 8 p.m. Professor G. I. Taylor, "Plastic Strain in Metals."

May 5.—The Chemical Society. Burlington House, Piccadilly, W.1. 8 p.m. Professor J. Masson Gulland, "Nucleic Acids."

May 6.—University College, Gower Street, W.C.1. 5.30 p.m. Professor Dr. P. Debye, "Molecular Physics: Low Temperatures and Magnetism."

Royal Institution, 21 Albermarle Street, W.1. 9 p.m. H. W. Melville, "The Nature of Chemical Reactivity."

May 9.—University College, Gower Street, W.C.1. 5.30 p.m. Professor P. Debye, "Molecular Physics: Structure of Liquids."

May 10.—University College, Gower Street, W.C.1. 5.30 p.m. Professor P. Debye, "Molecular Physics: Relaxation in Electric and Magnetic Fields."

May 11.—Society of Chemical Industry (Food Group). Annual General Meeting. London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1. 8 p.m.

Royal Society of Arts, John Street, Adelphi, W.C.2. 8.15 p.m. Ordinary Meeting. Colonel W.M. Carr, "The Co-ordination of Gas Supply."

The Society for the Study of Alchemy and Early Chemistry. The British Academy, Burlington Gardens, W.1. 8 p.m. Professor John Read, "Alchemy under James IV of Scotland."

British Chemical and Dye-stuffs Traders' Association, Ltd., Waldorf Hotel, Aldwych, W.C.2. 1 p.m. Annual Luncheon. 3 p.m. Annual General Meeting.

Birmingham.

May 3.—Electrodepositors' Technical Society. James Watt Memorial Institute, Great Charles Street. 7.30 p.m. Professor G. I. Finch, "The Formation and Properties of Cathodically Sputtered Metal Films."

May 11.—British Association of Chemists. Birmingham and Midland Section Annual Meeting.

Books Received

Combustion, Flames and Explosions of Gases. By Bernard Lewis and Guenther Von Elbe. London: Cambridge University Press. Pp. 415. 21s.

Weekly Prices of British Chemical Products

TRADE throughout the chemical market has followed a very even trend during the past week the movement being about the average for the period. Ex-contract deliveries are being taken up in satisfactory quantities and the volume of inquiry for new business is regarded as promising. A better interest has been displayed in acetic, tartaric and citric acids, and a fairly good demand has been circulating for solvents and fertilisers. The price of glycerine has been reduced by £10 per ton, but there are no important changes to record in other directions, quotations for general chemicals, rubber chemicals and wood distillation products remaining at last week's levels. In the coal tar market the main feature is the increase of 1d. per gal. in benzol prices as a result of the new tax introduced by the Budget. Toluol and other light hydrocarbons will no doubt be affected in due course, but, in the absence of any active demand for these products, quotations remain nominal at recent levels. In other directions the market continues quiet and unchanged.

Price Changes

Rises: Chromic Acid; Benzol, crude; standard motor; 90%; pure; Benzoic Acid.
Falls: Copper Sulphate (Manchester); Glycerine, pure double distilled; Carbolic Acid, crude, 60's; Cresylic Acid, 97/99%; Pale, 99/100%; Dark, 95%; Pitch, medium, soft.

MANCHESTER.—Although trading conditions this week on the Manchester chemical market have been something approaching normal after the holidays, not a big weight of fresh business in the bread-and-butter lines of heavy chemicals has been placed, current orders being for relatively near delivery positions. There is room for improvement in the movement of textile chemicals, and also in the quantities that are being called for in some other branches of the using industries, although, on the whole, contract deliveries are being taken up fairly satisfactorily. Chemical prices generally are on a steady basis. Among the by-products, however, the undertone continues uncertain owing to selling pressure and little expansion in the demand in this section can be reported.

GLASGOW.—Business in general chemicals for home trade has been rather quiet during the week, and export business still remains very limited. Prices generally continue quite steady at about previous figures with no important changes to report.

General Chemicals

ACETONE.—£45 to £47 per ton.

ACETIC ACID.—Tech, 80%, £30 5s. per ton; pure 80%, £32 5s.; tech., 40%, £15 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. **MANCHESTER:** 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ALUM.—Loose lump, £8 7s. 6d. per ton d/d; **GLASGOW:** Ground, £10 7s. 6d. per ton; lump, £9 17s. 6d.

ALUMINIUM SULPHATE.—£7 2s. 6d. per ton d/d **Lancs** **GLASGOW:** £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 1s. to 1s. 1d. per lb. d/d in cylinders. **SCOTLAND:** 10½d. to 1s. 0½d., containers extra and returnable.

AMMONIA, LIQUID.—**SCOTLAND:** 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.
AMMONIUM CHLORIDE.—Grey galvanising, £19 per ton, ex wharf.

AMMONIUM CHLORIDE (MURIATE).—**SCOTLAND:** British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Sal ammoniac.)

AMMONIUM DICHROMATE.—8½d. per lb. d/d U.K.

ANTIMONY OXIDE.—£68 per ton.

ARSENIC.—Continental material £11 per ton c.i.f., U.K. ports; Cornish White, £12 5s. to £12 10s. per ton f.o.r. mines, according to quantity. **MANCHESTER:** White powdered Cornish, £16 10s. per ton, ex store.

BARIUM CHLORIDE.—£11 10s. to £12 10s. per ton in casks ex store. **GLASGOW:** £11 10s. per ton.

BLEACHING POWDER.—Spot, 35/37%, £9 5s. per ton in casks, special terms for contracts. **SCOTLAND:** £9 per ton net ex store.

BORAX COMMERCIAL.—Granulated, £16 per ton; crystal, £17; powdered, £17 10s.; extra finely powdered, £18 10s., packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. **GLASGOW:** Granulated, £16, crystal, £17; powdered, £17 10s. per ton in 1-cwt. bags, carriage paid.

BORIC ACID.—Commercial granulated, £28 10s. per ton; crystal, £29 10s.; powdered, £30 10s.; extra finely powdered, £32 10s. in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. **GLASGOW:** Crystals, £29 10s.; powdered, £30 10s. 1-cwt. bags in 1-ton lots.

CALCIUM BISULPHATE.—£6 10s. per ton f.o.r. London.

CHARCOAL, LUMP.—£6 to £6 10s. per ton, ex wharf. Granulated, £7 to £9 per ton according to grade and locality.

CHROMETAN.—Crystals, 2½d. per lb.; liquor, £19 10s. per ton d/d station in drums. **GLASGOW:** 70/75% solid, £5 15s. per ton net ex store.

CHROMIC ACID.—10d. per lb., less 2½%; d/d U.K.

CHROMIUM OXIDE.—11d. per lb.; d/d U.K.

CITRIC ACID.—1s. 0½d. per lb. **MANCHESTER:** 1s. 0½d. **SCOTLAND:** B.P. crystals, 1s. 0½d. per lb.; less 5%, ex store.

COPPER SULPHATE.—£21 7s. 6d. per ton, less 2% in casks. **MANCHESTER:** £18 10s. per ton f.o.b. **SCOTLAND:** £19 10s. per ton, less 5%, Liverpool, in casks.

CREAM OF TARTAR.—100%, 92s. per cwt., less 2½%. **GLASGOW:** 99%, £4 12s. per cwt. in 5-cwt. casks.

FORMALDEHYDE.—£20-£22 per ton.

FORMIC ACID.—85%, in carboys, ton lots, £42 to £47 per ton.

GLYCERINE.—Chemically pure, double distilled. 1.260 s.g., in tins, £4 2s. 6d. to £5 2s. 6d. per cwt. according to quantity; in drums, £3 15s. 0d. to £4 7s. 6d.

HYDROCHLORIC ACID.—Spot, 5s. 6d. to 8s. carboy d/d according to purity, strength and locality.

IODINE.—Resublimed B.P., 6s. 4d. per lb. in 7 lb. lots.

LACTIC ACID.—(Not less than ton lots). Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50%, by vol., £41. One-ton lots ex works, barrels free.

LEAD ACETATE.—**LONDON:** White, £31 10s. ton lots; brown, £35. **GLASGOW:** White crystals, £32; brown, £1 per ton less. **MANCHESTER:** White, £32; brown, £31.

LEAD, NITRATE.—£32 per ton for 1-ton lots.

LEAD, RED.—£32 15s. 0d. 10 cwt. to 1 ton, less 2½% carriage paid. **SCOTLAND:** £32 per ton, less 2½% carriage paid for 2-ton lots.

LITHARGE.—**SCOTLAND:** Ground, £32 per ton, less 2½%, carriage paid for 2-ton lots.

MAGNESITE.—**SCOTLAND:** Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—**SCOTLAND:** £7 10s. per ton.

MAGNESIUM SULPHATE.—Commercial, £5 10s. per ton, ex wharf.

MERCURY.—Ammoniated B.P. (white precip.), lump, 5s. 10d. per lb.; powder B.P., 6s. 0d.; bichloride B.P. (corros. sub.) 5s. 1d.; powder B.P. 4s. 9d.; chloride B.P. (calomel), 5s. 10d.; red oxide cryst. (red precip.), 6s. 11d.; levig. 6s. 5d.; yellow oxide B.P. 6s. 3d.; persulphate white B.P.C., 6s. 0d.; sulphide black (hyd. sulph. cum sulph. 50%), 5s. 11d. For quantities under 112 lb., 1d. extra; under 28 lb., 5d. extra.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. **SCOTLAND:** Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NITRIC ACID.—Spot, £25 to £30 per ton according to strength, quantity and destination.

OXALIC ACID.—£48 15s. to £57 10s. per ton, according to packages and position. **GLASGOW:** £2 9s. per cwt. in casks. **MANCHESTER:** £49 to £55 per ton ex store.

PARAFFIN WAX.—**SCOTLAND:** 3½d. per lb.
POTASS CAUSTIC.—Solid, £35 5s. to £40 per ton according to quantity, ex store; broken, £42 per ton. **MANCHESTER:** £38 10s.

POTASSIUM CHLORATE.—£36 7s. 6d. per ton. **GLASGOW:** 4½d. per lb. **MANCHESTER:** £37 10s. per ton.

POTASSIUM DICHROMATE.—5½d. per lb. carriage paid. **SCOTLAND:** 5½d. per lb., net, carriage paid.

POTASSIUM IODIDE.—B.P. 5s. 6d. per lb. in 7 lb. lots.

POTASSIUM NITRATE.—Small granular crystals, £24 to £27 per ton ex store, according to quantity. **GLASGOW:** Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—**LONDON:** 9½d. per lb. **SCOTLAND:** B.P. Crystals, 9½d. **MANCHESTER:** B.P. 10½d. to 1s.

POTASSIUM PRUSSIAN.—6½d. per lb. **SCOTLAND:** 7d. net, in casks, ex store. **MANCHESTER:** Yellow, 6½d. to 6½d.

SALAMMONIAC.—Firsts lump, spot, £42 17s. 6d. per ton, d/d address in barrels. Dog-tooth crystals, £36 per ton; fine white crystals, £18 per ton, in casks, ex store. **GLASGOW:** Large crystals, in casks, £37 10s.

SALT CAKE.—Unground, spot, £3 11s. per ton.

SODA ASH.—58% spot, £5 17s. 6d. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid, 76/77° spot, 13s. 10s. per ton d/d station. **SCOTLAND:** Powdered 98/99%, £18 10s. in drums, £19 5s. in casks. Solid 76/77° £15 12s. 6d. in drums; 70/73%, £15 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts, 10s. per ton less.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£19-£20 per ton carriage paid North. GLASGOW: £18 10s. per ton net ex store.

SODIUM BICARBONATE.—Refined spot, £10 15s. per ton d/d station in bags. GLASGOW: £13 5s. per ton in 1 cwt. kegs, £11 5s. per ton in 2-cwt. bags. MANCHESTER: £10 10s.

SODIUM BISULPHITE POWDER.—60/62%, £20 per ton d/d 1 cwt. iron drums for home trade.

SODIUM CARBONATE MONOHYDRATE.—£20 per ton d/d in minimum ton lots in 2 cwt. free bags.

SODIUM CHLORATE.—£27 10s. to £32 per ton. GLASGOW: £1 11s. per cwt., minimum 3 cwt. lots.

SODIUM DICHROMATE.—Crystals cake and powder 4½d. per lb. net d/d U.K. with rebates for contracts. MANCHESTER: 4d. per lb. GLASGOW: 4½d. net, carriage paid.

SODIUM CHROMATE.—4½d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—Pea crystals, £15 5s. per ton for 2-ton lots; commercial, £11 5s. per ton. MANCHESTER: Commercial, £11; photographic, £15 10s.

SODIUM METASILICATE.—£14 5s. per ton, d/d U.K. in cwt. bags.

SODIUM NITRATE.—Refined, £8 per ton for 6-ton lots d/d. GLASGOW: £1 12s. 0d. per cwt. in 1-cwt. kegs, net, ex store.

SODIUM NITRITE.—£18 5s. per ton for ton lots.

SODIUM PERBORATE.—10%, 9½d. per lb. d/d in 1-cwt. drums.

SODIUM PHOSPHATE.—Di-sodium, £12 per ton delivered for ton lots. Tri-sodium, £15 to £16 per ton delivered per ton lots.

SODIUM PRUSSIAN.—d. per lb. for ton lots. GLASGOW: 5d. to 5½d. ex store. MANCHESTER: 4½d. to 5½d.

SODIUM SILICATE.—£8 2s. 6d. per ton.

SODIUM SULPHATE (GLAUBER SALTS).—£3 per ton d/d.

SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 to £3 10s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 12s. 6d.

SODIUM SULPHIDE.—Solid 60/62%. Spot, £11 15s. per ton d/d in drums; crystals, 30/32%, £9 per ton d/d in casks. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8 10s.

SODIUM SULPHITE.—Pea crystals, spot, £14 10s. per ton d/d station in kegs.

SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.

SULPHURIC ACID.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.

TARTARIC ACID.—1s. 1½d. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 1s. 1½d. per lb. GLASGOW: 1s. 1d. per lb., 5%, ex store.

ZINC SULPHATE.—Tech., £11 10s. f.o.r., in 2 cwt. bags.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 7d. to 1s. 2d. per lb., according to quality. Crimson, 1s. 6d. to 1s. 7½d. per lb.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARYTES.—£6 to £6 10s. per ton, according to quality.

CADMIUM SULPHIDE.—4s. 9d. to 5s. per lb.

CARBON BLACK.—4d. per lb., ex store.

CARBON DISULPHIDE.—£31 to £33 per ton, according to quantity, drums extra.

CARBON TETRACHLORIDE.—£41 to £46 per ton, according to quantity, drums extra.

CHROMIUM OXIDE.—Green, 10½d. to 11d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

INDIA-RUBBER SUBSTITUTES.—White, 4½d. to 5½d. per lb.; dark 4d. to 4½d. per lb.

LAMP BLACK.—£24 to £26 per ton del., according to quantity. Vegetable black, £35 per ton upwards.

LEAD HYPOSULPHITE.—9d. per lb.

LITHOPONE.—Spot, 30%, £16 10s. per ton, 2-ton lots d/d in bags.

SULPHUR.—£9 to £9 5s. per ton. SULPHUR PRECIP. B.P., £55 to £60 per ton. SULPHUR PRECIP. COMM., £50 to £55 per ton.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quantity.

VERMILION.—Pale, or deep, 4s. 9d. per lb., 1-cwt. lots.

ZINC SULPHIDE.—£58 to £60 per ton in casks ex store, smaller quantities up to 1s. per lb.

Nitrogen Fertilisers

AMMONIUM SULPHATE.—The following prices have been announced for neutral quality basis 20.6% nitrogen, in 6-ton lots delivered farmer's nearest station up to June 30, 1938: November, £7 8s.; December, £7 9s. 6d.; January, 1938, £7 11s.; February, £7 12s. 6d.; March/June, £7 14s.

CALCIUM CYANAMIDE.—The following prices are for delivery in 5-ton lots, carriage paid to any railway station in Great Britain up to June 30, 1938: November, £7 10s.; December, £7 11s. 3d.; January, 1938, £7 12s. 6d.; February, £7 13s. 9d.; March, £7 15s.; April/June, £7 16s. 3d.

NITRO CHALK.—£7 10s. 6d. per ton up to June 30, 1938.

SODIUM NITRATE.—£8 per ton for delivery up to June 30, 1938.

CONCENTRATED COMPLETE FERTILISERS.—£11 4s. to £11 13s. per ton in 6-ton lots to farmer's nearest station.

AMMONIUM PHOSPHATE FERTILISERS.—£10 19s. 6d. to £14 16s. 6d. per ton in 6-ton lots to farmer's nearest station.

Coal Tar Products

BENZOL.—At works, crude, 10½d. to 10¾d. per gal.; standard motor, 1s. 3¾d. to 1s. 4½d.; 90%, 1s. 4½d. to 1s. 5½d.; pure, 1s. 8d. to 1s. 9½d. GLASGOW: Crude, 10d. to 10½d. per gal.; motor, 1s. 4d. to 1s. 4½d. MANCHESTER: Pure, 1s. 7d. to 1s. 8d. per gal.

CARBOLIC ACID.—Crystals, 7½d. to 8½d. per lb., small quantities would be dearer; Crude, 60's, 3s. 0d. to 3s. 3d.; dehydrated, 4s. 4½d. to 4s. 7½d. per gal. MANCHESTER: Crystals, 7½d. per lb. f.o.b. in drums; crude, 3s. to 3s. 6d. per gal.

CREOSOTE.—Home trade, 5½d. per gal., f.o.r. makers' works; exports, 6½d. to 6¾d. per gal., according to grade. MANCHESTER: 4½d. to 5½d. GLASGOW: B.S.I. Specification, 6d. to 6½d. per gal.; washed oil, 5d. to 5½d.; lower sp. gr. oils, 5½d. to 6½d.

CRESYLIC ACID.—97/99%, 2s. 2d. to 2s. 5d.; 99/100%, 4s. to 5s. 6d. per gal., according to specification; Pale, 99/100%, 2s. 6d. to 2s. 9d.; Dark, 95%, 1s. 10d. to 2s. per gal. GLASGOW: Pale, 99/100%, 5s. to 5s. 6d. per gal.; pale, 97/99%, 4s. 6d. to 4s. 10d., dark, 97/99%, 4s. 3d. to 4s. 6d.; high boiling acids, 2s. to 2s. 6d. American specification, 3s. 9d. to 4s. MANCHESTER: Pale, 99/100%, 3s.

NAPHTHA.—Solvent, 90/160, 1s. 6d. to 1s. 7d. per gal.; solvent, 95/160%, 1s. 7d. to 1s. 8d., naked at works; heavy 90/190%, 1s. 1d. to 1s. 3d. per gal., naked at works, according to quantity. GLASGOW: Crude, 6½d. to 7½d. per gal.; 90%, 160, 1s. 5d. to 1s. 6d., 90%, 190, 1s. 1d. to 1s. 3d.

NAPHTHALENE.—Crude, whizzed or hot pressed, £5 5s. to £6 5s. per ton; purified crystals, £14 per ton in 2-cwt. bags. LONDON: Fire lighter quality, £5 10s. to £7 per ton. GLASGOW: Fire lighter, crude, £6 to £7 per ton (bags free). MANCHESTER: Refined, £15 10s. per ton f.o.b.

PITCH.—Medium, soft, 33s. per ton, f.o.b. MANCHESTER: 32s. 6d. f.o.b., East Coast. GLASGOW: f.o.b. Glasgow, 35s. to 37s. per ton; in bulk for home trade, 35s.

PYRIDINE.—90/140%, 13s. 6d. to 15s. per gal.; 90/160%, 10s. 6d. to 13s. 3d. per gal.; 90/180%, 3s. 3d. to 4s. per gal. f.o.b. GLASGOW: 90% 140, 10s. to 12s. per gal.; 90% 160, 9s. to 10s.; 90% 180, 2s. 6d. to 3s. MANCHESTER: 10s. 6d. to 11s. 6d. per gal.

TOLUOL.—90%, 1s. 10d. per gal.; pure, 2s. 2d. GLASGOW: 90%, 120, 1s. 10d. to 2s. 1d. per gal.

XYLOL.—Commercial, 1s. 11d. to 2s. per gal.; pure, 2s. 3d. to 2s. 3½d. GLASGOW: Commercial, 2s. to 2s. 1d. per gal.

Wood Distillation Products

CALCIUM ACETATE.—Brown, £7 10s. to £8 per ton; grey, £9 10s. to £10. MANCHESTER: Brown, £9 10s.; grey, £11 10s.

METHYL ACETONE.—40.50%, £35 to £40 per ton.

WOOD CREOSOTE.—Unrefined, 4d. to 6d. per gal., according to boiling range.

WOOD NAPHTHA, MISCIBLE.—3s. 3d. to 3s. 6d. per gal.; solvent, 3s. 6d. to 3s. 9d. per gal.

WOOD TAR.—£2 to £8 per ton, according to quality.

Intermediates and Dyes

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZIDINE, HCl.—2s. 7½d. per lb., 100% as base, in casks.

BENZOIC ACID, 1914 B.P. (ex toluol).—1s. 11½d. per lb. d/d buyer's works.

m-CRESOL 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.

o-CRESOL 30/31° C.—6½d. to 7½d. per lb. in 1-ton lots.

p-CRESOL, 34.5° C.—1s. 7d. to 1s. 8d. per lb. in ton lots.

DICHLORANILINE.—2s. 1½d. to 2s. 5½d. per lb.

DIMETHYLANILINE.—Spot, 1s. 7½d. per lb., package extra.

DINITROBENZENE.—8½d. per lb.

DINITROCHLOROBENZENE, SOLID.—£79 5s. per ton.

DINITROTOLUENE.—48/50° C., 9½d. per lb.; 66/68° C., 11d.

DIPHENYLAMINE.—Spot, 2s. 2d. per lb., d/d buyer's works.

GAMMA ACID, Spot, 4s. 4½d. per lb. 100% d/d buyer's works.

H ACID.—Spot, 2s. 7d. per lb.; 100% d/d buyer's works.

NAPHTHIONIC ACID.—1s. 10d. per lb.

β-NAPHTHOL.—£97 per ton; flake, £94 8s. per ton.

α-NAPHTHYLAMINE.—Lumps, 1s. 1d. per lb.

β-NAPHTHYLAMINE.—Spot, 3s. per lb.; d/d buyer's works.

NEVILLE AND WINTHER'S ACID.—Spot, 3s. 3½d. per lb. 100%.

o-NITRANILINE.—4s. 3½d. per lb.

m-NITRANILINE.—Spot, 2s. 10d. per lb. d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 10d. to 2s. 3½d. per lb. d/d buyer's works.

NITROBENZENE.—Spot, 4½d. to 5d. per lb., in 90-gal. drums, drums extra. 1-ton lots d/d buyer's works.

NITRONAPHTHALENE.—10½d. per lb.; P.G., 1s. 0½d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 11d. per lb.; 100% d/d buyer's works.

SULFRANILIC ACID.—Spot, 8½d. per lb. 100%, d/d buyer's works.

o-TOLUIDINE.—11½d. per lb., in 8/10-cwt. drums, drums extra.

p-TOLUIDINE.—2s. per lb., in casks.

m-XYLIDINE ACETATE.—4s. 8d. per lb., 100%.

Company News

Greeff-Chemicals Holdings announce final dividend of 8½ per cent. actual, less tax, on ordinary, making 12½ per cent. for 1937.

Cerebos, Ltd., salt manufacturers, are paying a final dividend for 1937 of 30 per cent., making, with the interim of 10 per cent. paid last October, a total of 40 per cent., less tax. A similar payment was made in the previous year.

Salt Union, Ltd., show a net profit of £158,518, against £206,370 in 1936. The ordinary dividend of 4½ per cent., tax free, which is announced, compares with 9 per cent., less tax, paid in the previous year. The amount carried forward is increased from £14,762 to £15,333.

Reckitt and Sons announce profit for 1937 of £1,152,485 (£1,157,312 for 1936), of which £32,500 is reserved for N.D.C., a final dividend of 1s. 3d. per share and a bonus of 3d. per share be paid on the ordinary shares, making, with the interim distributions, a total of 4s. 6d. per share for the year, the same as for 1936.

United Turkey Red Co., show a loss for 1937 of £88,557 (£48,775). From reserve for insurance no longer required, £23,000; £3,264 brought in, and £63,821 from general reserve, leaving credit of £1,528 forward. Directors recommend that dividend on 4 per cent. first preference shares for half-year to December 31 last, be charged against reserves. No payment on second preference or ordinary.

Stewarts and Lloyds, Ltd., announces an increase of 5 per cent. in its dividend for 1937. The payment on the deferred stock is stepped up from 7½ per cent. to 12½ per cent.—the biggest dividend since 1924. The 1937 dividend is payable on a larger deferred capital—£5,669,650, including the 1,042,910 £1 shares issued at a premium to holders in December, 1936. The latter shares did not rank for the 7½ per cent. dividend paid for 1936. The dividend on the 625 Liaison deferred shares—held by Tube Investments, Ltd.—is also announced. Each Liaison share ranks as 1,000 deferred shares, so that the dividend is 12.500 per cent., against 7.500 per cent. in 1936.

British Celanese, Ltd., announce that owing to the unfavourable trading conditions which have prevailed, it has been decided to pass the payment of the half-year's dividend on the 7 per cent. cumulative first preference shares due to-day. The authorised capital of the company is £10,450,000, of which £8,961,333 10s. is issued in £2,500,000 7 per cent. cumulative first preference shares, £4,250,000 7½ per cent. participating second cumulative preference shares of £1 each and £2,211,333 10s. ordinary shares of 10s. each. Out of profits for 1934 no preference dividends were paid, but in 1935 the company paid 2½ years' arrears of dividend on the first preference capital, bringing dividends up to April 30, 1933, and in the following year all arrears were cleared with a distribution in respect of the three years to April 30, 1936. Last year the first preference dividends were paid on the due dates.

Bryant and May, Ltd., match manufacturers, reveal a slight fall in profits for the year ended March 31 last. Net profits amounted to £562,168, compared with £586,699. Both figures are struck after allowing £50,000 for depreciation, an unstated sum for contingencies, and in addition this year an amount for N.D.C. The ordinary dividend is being maintained at 25 per cent., tax free, with a final payment of 15 per cent., tax free. Last year a bonus dividend of £250,000 was also distributed from general reserve. A final dividend of 5 per cent., tax free, is being paid on the partnership shares, which again makes 10 per cent., tax free, for the year. The number of these shares issued during the year was 9,654. Employees' proportion of dividend absorbs £42,627 compared with £42,159. A sum of £100,000 is to be transferred to general reserve, the same as in 1936-37, which leaves the carry-forward at £140,952, compared with £138,123 brought in.

The British Drug Houses, Ltd., in their report for the year ended December 31, 1937, show a trading profit of £77,230, from which must be deducted amortisation of leaseholds and depreciation, directors' fees, income tax and national defence contribution amounting to £19,162, and leaving a balance of £58,068. Adding £11,066 brought forward, this makes a total of £69,134. After deducting from this total the gross dividend on the preference share capital amounting to £17,188, there remains a balance of £51,946. The dividend of 6 per cent. on the ordinary shares absorbs £24,000. The balance of expenditure on leasehold premises surrendered to be written off is £8,928; the transfer to reserve fund amounts to £7,500, leaving to be carried forward £11,518. The directors state that trading profit for the year increased by some £6,000. Of this, more than £4,000 is absorbed in a larger provision for taxation, so that the net profit shows an increase of £1,354. During the past year the balance of the 5 per cent. preference share capital (£25,000) was issued. As before, the shares were sold at a premium, and the full amount thus yielded has been retained by the company for the benefit of the shareholders as a whole, such sum being included in the balance sheet in the form of reserves. The Australian and Canadian companies have each made substantial progress.

Crosse and Blackwell, Ltd., show an increase in net profits of £16,300 to £91,390. The directors propose to maintain the ordinary dividend at 2½ per cent.

Magadi Soda Co., Ltd. (controlled by I.C.I.), in their report for 1937 have a profit and loss account showing debit balance of £1,327 (£5,204) after charging obsolescence and debenture interest, and directors regret that no dividends can be paid for year under review. Debit forward £112,603 (£111,276).

Lever Brothers and Unilever, Ltd., and **Lever Brothers and Unilever N.V.**, announce increased dividends for 1937. The dividend in the case of the English company is 6 per cent. (making, with the interim dividend of 4 per cent. paid by Unilever, Limited, a total for the year of 10 per cent.) on each £1 of stock (7½ per cent. was the total for 1936). In the case of the Dutch company, the corresponding dividend is 45fl. (making, with the interim dividend of 30fl., a total for the year of 75fl.) on every share of 1,000fl. Aggregate net profits for the combine as a whole, after charging taxation, debenture interest and depreciation, increased by £187,208 to £12,749,991.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

MAJOR BROTHERS, LTD., Shrewsbury, manufacturers of explosives, paints, etc. (M., 30/4/38.) April 11, £5,250 mortgage, to Mrs. M. James, Aberystwyth, and another; charged on Old Grammar School House, School Gardens, Shrewsbury, etc. * Nil. March 23, 1937.

MODERN FUELS, LTD., Seaham Harbour. (M., 30/4/38.) April 11, £12,000, secured notes, part of a series already registered.

LACCO PROPRIETORS, LTD., Colindale, manufacturers of lacquers, etc. (M., 30/4/38.) April 13, series of £5,000 (not ex.) debentures, present issue £2,500; 2nd general charge. * £177. December 31, 1936.

ALUMINIUM PROTECTION CO., LTD., London, N.W. (M., 30/4/38.) April 14, £200 debentures, part of a series already registered. * £16,805. October 8, 1937.

Satisfactions

MAJOR BROTHERS, LTD., Shrewsbury, manufacturers of explosives, paints, etc. (M.S., 30/4/38.) Satisfactions April 11, of mortgages registered August 12, 1935, and August 28, 1937.

PILKINGTON BROTHERS, LTD., Liverpool, glass manufacturers. (M.S., 30/4/38.) Satisfaction April 14, of debenture stock registered May 4, 1925, to the extent of £45,000.

County Court Judgment

THORNFIELD, GODFREY, 88 Cambridge Road, N.W.6, manufacturing chemist (trading as Beaucaire Laboratories). (C.C., 30/4/38.) £36 12s. 9d. March 8.

Declaration of Solvency Filed

DEHYDRATION, LTD., London, S.W. (D.S.F., 30/4/38.) April 13.

URLAY NOOK HOLDINGS, LTD. (formerly Egglecliffe Chemical Co., Ltd.), Egglecliffe. (D.S.F., 30/4/38.) April 12.

Partnerships Dissolved

"**DRS. BEALE AND SUCKLING**" (John F. Beale and E. V. Suckling), analytical chemists and bacteriologists, The Counties Public Health Laboratories, 91 Queen Victoria Street, London, October 31, 1937, so far as concerns J. F. Beale who retires.

Company Winding-up Voluntarily

MIDLAND OIL AND EQUIPMENT CO., LTD. (C.W.U.V., 30/4/38.) By reason of its liabilities, April 20, Frank Lindley Oldham, F.C.A., of 4 and 6 West Street, Boston, and Frederick Ernest Bendall, F.L.A.A., of 4 Charterhouse Square, London, E.C.1, appointed joint liquidators.

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